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The Outlook

The Joint Planning White Paper

THE White Paper issued last week under the title of "The Organisation for Joint Planning" was evidently mainly intended to show that (in its own words) "the Joint Staff advocated from time to time in Parliament and the Press has in fact existed for many years." It is a good thing that that fact should be known, even though the claim may seem to have been rather exaggerated. In fact, it is not altogether easy for the ordinary civilian reader to grasp how the organisation described actually works. Probably only those who are actually engaged in one of the sections set forth in the diagram which accompanied the White Paper can thoroughly grasp how far the organisation works in practice as a joint General Staff.

The whole of this organisation, as set forth in the diagram, is under the Defence Committee, and its chairman is the Minister of Defence, who is also the Prime Minister. Mr. Churchill has a great capacity for work, and he is known to have made a deep study of strategy. It is also out of the question that anybody but he should be Prime Minister during this war. At the same time, one cannot help wishing that he could devote the whole of his time and energies to the task of Defence Minister, leaving the other duties of Prime Minister to someone else.

Joint committees may perhaps make a joint General Staff, as the White Paper claims, but they do not make one Commander-in-Chief for the whole of the country's war effort. It seems that Hitler holds that position, just as in the past Kings like Alexander the Great and Frederick the Great held it. Now, in various theatres of war, single Commanders-in-Chief have been appointed over the forces of all three Services, as well as of all the United Nations. That appears to us to be the ideal, and at our headquarters in London we British do not yet seem to have attained it.

Bombers and New Guinea

THE Royal Australian Air Force, with American assistance, is doing a remarkable piece of work by holding the Japanese at bay in New Guinea and the neighbouring islands. Despite their efforts in Burma, the Japanese have good reason to desire the invasion of Australia as a means of securing their flank while they try to make headway towards India, possibly with the idea of meeting a German advance from the Middle East. To secure their position in the Pacific they need to seize all the naval bases of the United Nations, and now that Singapore and Java have fallen, Sydney becomes the most important one from which in due time an Allied fleet may undertake the reconquest of the Pacific. If Japan's sea power is broken, then her troops in all the places which they have seized will be left, so to speak, in the air.

For this reason the enemy is most anxious to establish himself in New Guinea and make there a base for an attack on Australia. Australia, now working under the orders of General MacArthur, is meeting this threat with her Air Force. Her bombers are constantly raiding Rabaul, Lae and Salamaua with remarkably good effect, while her fighters and A.A. guns are protecting Port Moresby, which is the next Japanese objective. All this dynamic defence is being carried out with remarkably good results, and the enemy is now in no better position than he was weeks ago. At Rabaul he

has lost a substantial number of ships to the bombs of the R.A.A.F. and its American helpers, and Japan's capacity for replacing ships must be limited.

The position off Australia is not the same as that of the Channel invasion ports, for in the latter case the Royal Navy rules the sea. The struggle for New Guinea may go down to history as the first outstanding case of defence by bombers.

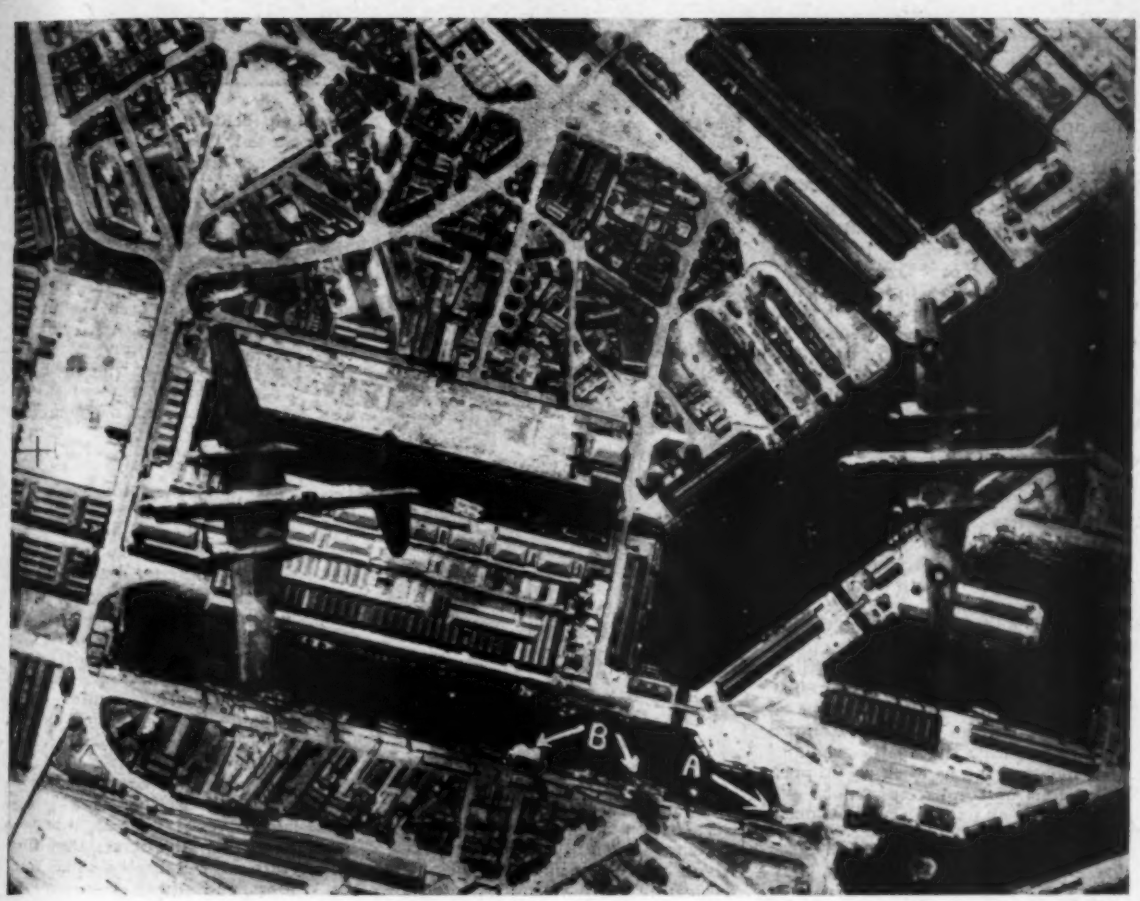
Widespread Offensive

AFTER Lubeck came the turn of Rostock, another Baltic port, which was hammered by Bomber Command for four successive nights at the end of last week, and may receive further treatment before these words come into the hands of our readers. It is not always that Bomber Command is able to concentrate its efforts on one important centre for several nights in succession. There are various reasons why this is not always possible; the weather may change and so dictate a visit to another place, or perhaps the Admiralty or War Office may have urgent need for Bomber Command to direct its attention elsewhere. When it is possible to raid the same locality for several nights in succession, the effect is likely to be greater and more beneficial to the Allied cause than if an interval is given for recuperation. Such tactics, if always followed, would mean that there would be no element of surprise on the third night, the defences might have been strengthened by rushing more A.A. guns to the spot, and the R.A.F. might well lose more bombers and do less damage, but used with discretion these tactics are very effective.

With the Germans trying to strengthen their Finnish front, and the British and Americans pouring convoys full of supplies into Murmansk, and each anxious to interfere with the other, Baltic ports have lately acquired a special importance, quite apart from whether aircraft factories are there. It is, therefore, a very good thing that the R.A.F. now possesses the four-engined bombers which can not only get there and back, but can carry a load of bombs which will do real damage. The same remarks apply to the armament works at Skoda in Czechoslovakia, which certainly were in urgent need of attention from British bombers, and which received that attention last Saturday. The enemy must have looked on that place as a fairly safe centre of production, as the raids in 1940 were only made by two-engined bombers which could not have carried a heavy bomb load in addition to their fuel. It is a different matter when Stirlings are on the job.

Before the collapse of France nobody dreamed that fighters would ever become offensive weapons, but that has now come to pass. The Spitfire and Hurricane sweeps over Northern France are now a factor in determining the shape of this summer's campaigns, for they hold down half the German fighter force.

POWERLESS FOR COLLABORATION: Direct hits on an electric power station at Mondeville, near Caen, during a daylight raid by Douglas Bostons. The power station belongs to the Société Metallurgique de Normandie.



BOSTONS OVER LE HAVRE: (A) Bombs exploding across the dock gates. (B) Other bombs bursting among barges.

War in the Air

Malta's Heroic Defence : Bomber Command's Attacks on Germany : A Million and a Half Germans Tied Down to Defence : Gen. Wavell on India's Defence

MALTA continues to be the main object of *Luftwaffe* raids. Their bombers come over almost incessantly, by day with fighter escorts of considerable strength. These are rendered absolutely necessary by the magnificent defence put up by the Spitfires and Hurricanes on the island. Observers have commented many times on the completeness of the understanding which exists between the British fighters and the A.A. guns. The latter have been shooting with the accuracy which comes from continuous practice, and their numbers are most impressive. In the first 22 days of April no fewer than 117 Axis aircraft have been destroyed for certain, 38 more probably destroyed, and quite 100 others damaged in their raids on the island. A German airman in a broadcast gave the following account of Malta's defences: "Malta is one huge battery of A.A. guns," he said. "Heavy and light A.A. guns are at every important point. The shells come up like a thunderstorm of steel. When the guns cease, Spitfires and Hurricanes hang on to the tails of the German dive-bombers, trying to shoot them down during the dive. The British gunners shoot well, and the German air crews need the highest skill and courage to get through." Not only is Malta defending itself and remaining a centre of aggression in the Mediterranean, but it is also giving great relief to the Russian front. In fact, it is calculated that, while about half of Germany's fighter strength is tied down in northern France to meet the daylight sweeps by Fighter Command, Malta is containing a very large proportion of the remainder. As a result, the Russian fighters have had things very much their own way of late, and have consequently taken heavy toll of the German troop-carrying machines which have been trying to take up men and supplies to the hard-pressed German points in Russia. It has been noticed lately that German fighters have been reluctant to engage the Russians; that indicates that their best pilots are in France and Sicily.

News has come through that the R.A.F. has also helped Russia in another way. Owing to the thaw and mud on most of the eastern front, the chief activity is now in the north against the Finns. The Germans had prepared to send large convoys of sup-

WAR IN THE AIR

plies up by sea to that front, and had collected shipping for the purpose at Lubeck. The raid by Bomber Command on that port is said to have dislocated those plans very seriously.

Bomber Command has recently been paying special attention to targets whose destruction or dislocation is calculated to give most help in the Battle of the Atlantic and to the Russians. The Augsburg raid was intended to upset the programme of turning out U-boats, while other raids have interfered with the production of tanks and lorries which would mainly be intended for use against the Russians. During the winter and early spring the German policy has been to conserve resources, especially in aircraft. Their broadcasts have told their own people that Britain has been undergoing continuous heavy air raids, whereas, as everybody in this country knows, the German efforts have been on a very light scale and might almost be described as token raids. In the month from March 20th to April 20th there were six separate nights on which we dropped a greater weight of bombs on Germany than the *Luftwaffe* dropped on Great Britain during the whole of that month. In one week we dropped 1,000 tons of bombs by night, and they cannot all have fallen innocuously on open fields.

The Day Sweeps

THE day sweeps by our fighters must also be very annoying to the Germans. They upset his programme of conserving his material for the spring offensive. When bombers accompany our fighters, the German fighters must take off to prevent us from having things all our own way, and even when our fighters go by themselves, they make low-level attacks and their cannon do damage to things which the Germans want to preserve. So again their fighters are forced to offer opposition, which means using up material instead of conserving it, and that is what suits our book.

It has to be recognised that the strength of Bomber Command, though it has increased, is not increasing at the rate which we should like. That is because we are obliged to send so many machines to Russia and to our own overseas fronts. But American production is getting into its stride, and when that can relieve us of some of our responsibilities, then Bomber Command will be able to get the full benefit of the output of British factories.

But even though the British bombing offensive is not yet so heavy as could be desired, it has the effect of keeping about a million and a half Germans on the defensive in Western Germany and Occupied France. About half of this number are civilians engaged in what we call civil defence, as wardens, fire fighters, etc., while the other half, who are nearly all airmen or soldiers, are engaged in the immense active defence system. The searchlight belt which stretches across North-western Germany is nearly 200 miles long, and every five miles there are groups of from ten to thirty lights. In some places the belt is twenty miles deep. The industrial cities have particularly large numbers of lights, and there are said to be about 120 of them at Cologne, each manned by a crew of about fifteen. There are also A.A. guns in their thousands, and Bremen, for example, has some 500 of them. Each light A.A. gun has a team of twelve men, while a heavy gun needs no less than twenty-five.

KINDRED SPIRITS : Mr. Churchill chatting to a Major-General of an air-borne division.

Sqn. Ldr. J. D. Nettleton, who led the recent daylight raid by Avro Lancasters on the M.A.N. diesel engine factory at Augsburg, tracing his route on a map for Wing Cdr. Bowman.

Mine-laying Aircraft

THEN there are the defensive fighter squadrons, for day and for night, and, above all this, numbers of naval ratings have to be constantly at work sweeping the mines which are laid by our aircraft. This mine-laying work goes on constantly. It is exacting work for the crews, and they do not often have the satisfaction of knowing what successes they have scored. It may be weeks before a mine which has been laid with great care by night is bumped into by a ship in the German service.

Aircraft naturally cannot carry so many mines at a time as a special mine-laying vessel can do, but aircraft have this advantage, that they can return at will to the same tract of water and drop more mines, whereas a ship cannot venture into an area which it has mined unless and until it is known that that area has been very thoroughly swept by the enemy; otherwise it would run the risk of being hoist by its own petard.

India's Air Defence

GENERAL WAVELL'S broadcast warning to India was very timely. It would be well if commanders more frequently explained the military position to those who are not in a position to estimate it for themselves. The C.-in-C. (it would be more formally correct to say "His Excellency") explained that it was impossible to line the whole coast of India with troops, and that he had no intention of attempting such a thing. The right thing is to hold strong mobile forces at nodal points, from which they can strike rapidly at an invaded area. About air defences he said that fighters and A.A. guns were strong enough in the most threatened quarters to cause Japanese raiders heavier loss than they had yet suffered elsewhere. India would be defended by a

WAR IN THE AIR

ENEMY AIR LOSSES TO APRIL 25th.

	Over G.B.	Over Continent	Middle East
April 19	0	0	8
" 20	0	0	9
" 21	0	0	8
" 22	0	0	7
" 23	2	0	4
" 24	0	5	1
" 25	5	9	8
	7	14	45

Totals: North, 5,786; Middle East, over 3,717; Far East (unofficial) 516.

powerful air striking force which would concentrate rapidly against any threatened point. After that warning, if Japanese troops should land at some undefended stretch of coastline, the local inhabitants will have no reason to jump to the conclusion that the British Raj has been defeated and that they have been deserted by their protectors. Incidentally, General Wavell pointed out that in this war the Japanese have not yet deliberately bombed civil populations, though he had no doubt that they would do so if it suited their book. But surely that has been done very many times in China!

Great R.A.F. Offensive

THE fine weather at the end of last week saw great activity by the R.A.F. both by night and by day. For four nights running heavy bombers attacked the Baltic port and production centre of Rostock. Before the war the head office and works of the Heinkel company were situated there, and no doubt those works are still very important, though one may expect that the German policy of dispersal has been applied to this company as it has been to others. The port is also of considerable consequence in view of the attempts of both sides to get their own supplies through into the extreme north of Europe and at the same time to interfere with the convoys of the other side. So Bomber Command divided its attention between the port and the Heinkel works. The raid on Thursday last seems to have taken the Germans by surprise, but they hurriedly strengthened the defences, and our attacks on Friday and Saturday met with more opposition. None the less, great damage was done by the mixed forces of Lancasters, Manchesters, Stirlings, Halifaxes, Wellingtons, Whitleys and Hampdens, and huge fires were started on each night.

BRITISH AIR LOSSES TO APRIL 25th.

	Over G.B. A'crft.	Over Continent B'brs.	Over Continent Ftrs.	Middle East A'crft.
April 19	0	0	0	0
" 20	0	0	0	2
" 21	0	0	0	1
" 22	0	4	0	1
" 23	0	4	0	0
" 24	0	2	10	4
" 25	0	6	15	5
	0	16	25	13 (2 pilots safe)

Totals: North, 3,564; Middle East, about 1,092; No reliable figures for Far East

Loading drums of ammunition for the 20 mm. cannons on a Bristol Beaufighter. The standard armament of the Beaufighter includes four 20 mm. cannons and six rifle calibre machine guns.

On Saturday night Stirlings flew the 1,300 miles to the Skoda armament factory near Pilsen in Bohemia. This important factory was twice raided in the autumn of 1940, but had been left alone since then. Now that Bomber Command has Stirlings at its disposal, worth-while loads of bombs can be delivered even at such a distance. We all hope that no Czech workmen were killed, but certainly the raid will encourage the whole of the gallant Czech nation. It will certainly help the ca'canny policy of the workers.

Daylight Raids

DURING the daylight hours the raids over northern France have been almost continuous. Spitfires have done most of the work, though sometimes Hurricanes have been mentioned. Of course, numbers of Hurricanes have lately been sent overseas, some to Russia and others to the Middle and Far East fronts. Some of these raids escorted Boston bombers, which is one way of ensuring that the German fighters will have to take off and dispute matters with the R.A.F. If they were allowed to follow their own policy (which is deliberate policy, not mere inclination of the pilots) the German fighters would remain on the ground so as to conserve their machine strength for the coming great battles in Russia and elsewhere. Our policy is to force them to fight. Even when no British bombers go with a raid, the cannons of the new Spitfires can do a lot of damage to targets on the ground. Fighter Command has also been indulging in more than a few night raids, helped by the moonlight. The feelings of the French people of the north, as they see this continuous British offensive, can easily be imagined. It is an outward and visible sign that the day of Victory is drawing nearer.

The Germans have made some show of reprisals, and on Saturday night they raided Bath with some severity. Casualties and damage were rather heavy, but even so the German effort does not compare with that of eighteen months ago. They lost five bombers in the process.

On Other Fronts

SATURDAY also saw three deliberate heavy raids by daylight on hospitals in Malta. The Red Cross on the roofs evidently was the target. A German officer prisoner in one hospital expressed his horror and amazement. A prisoners-of-war camp near one hospital was also hit and one Italian prisoner was killed and others injured.

Saturday was likewise a busy day in the Pacific, for the Japanese made their fourteenth raid on Darwin, using 24 bombers. The defences shot down eight enemy bombers and three fighters, and the damage to the town was practically negligible. There were also raids over Port Moresby and the Solomon Islands.

More Chinese troops have been pouring down into Burma, but the Anglo-Chinese withdrawals have continued. Help from American aircraft is expected, but the difficulty is to get them from India to Burma, or rather to get the ground equipment across, when the Japanese command the sea and there is no adequate connection by road and none at all by rail. Why was no proper road constructed as soon as the Japanese established themselves in Indo-China?

HERE AND THERE

Another P. and P. Gift

THE Merchant Navy Comforts Service, 62, Heath Street, London, N.W.3, has received £31 12s. 10d. as a further donation from the employees' charity fund of Phillips and Powis Aircraft, Ltd., Reading.

The Service aims at raising £100,000 during 1942.

Rumbold Appointment

MR. THOMAS O. JONES has been appointed General Works Manager of L. A. Rumbold and Co., Ltd., Kilburn, the specialists in aircraft seating and similar equipment, in succession to the late Mr. F. H. Kybert, whose death was recently announced in *Flight*. Mr. Jones has been with the company for a number of years and was Mr. Kybert's assistant.

Wright Memorial Lecture

LORD BRABAZON OF TARA, M.C., F.R.Ae.S., is to give the 30th Wilbur Wright Memorial Lecture, which will be held at the Institution of Mechanical Engineers, Storey's Gate, St. James's, S.W.1, at 6.30 p.m. on Thursday, May 28th.

Lord Brabazon, the former Minister of Aircraft Production, is Vice-President of the Royal Aeronautical Society. He will be more familiar to our readers as Lt.-Col. Moore-Brabazon.

Scientists and the War

THE Association of Scientific Workers is holding its annual Council meeting on May 2nd and 3rd at the London School of Hygiene and Tropical Medicine, Holborn, W.C.1.

Mr. R. A. Watson Watt, F.R.S., President of the A.Sc.W., will be in the chair. The Association has increased its membership from 2,000 to 5,000 in the past year, and has just now affiliated to the Trades Union Congress.

The main items for discussion will be the ways in which scientists and engineers can aid war production, and the need for improved professional status and educational facilities.

Young Modellers to Help

AMERICAN high school youths, says the *Civil Aeronautics Journal*, have been asked by Secretary of the Navy, Frank Knox, to participate in a vital part of the Navy's training programme by producing 500,000 aircraft models—10,000 each of 50 different types of fighting aircraft—for training personnel in aircraft recognition and range estimation in gunnery practice and for training civilians in aircraft recognition.

The Office of Education is extending the request to 26,000 youths and the Navy Bureau of Aeronautics is preparing plans and specifications for the aircraft.

Monoxide Peril

WRITING on the invisible menace of monoxide gas in exhaust fumes, W. B. Burchall, secretary of the Air Transport Association of Canada, draws attention, in the March issue of *Canadian Aviation*, to the remarkable fact that in the C.A.A. analysis of accidents for 1940, more than one-third of those on scheduled airlines are attributed to "poor technique" and "carelessness" on the part of the pilot.

Considering the flying experience of airline pilots, their physical fitness, long training, and their instinctive ingrained solicitude for the safety of their passengers and craft, Mr. Burchall puts forward the theory that at the time of the accident they were probably under the unsuspected influence of carbon monoxide poisoning productive of subnormality.

Recent research, he points out, has shown that a very small amount of this invisible, odourless and tasteless gas will seriously affect the victim's judgment. Its first effects are often mental and it can induce a reckless mood.

Faults in cabin-heaters of the exhaust muffler type, he thinks, may well be at the bottom of many accidents.

LONG-RANGE CANNON: The American version of the Airacobra, which mounts the 37 mm. cannon backed by light and heavy machine guns, is the hardest hitting fighter in the U.S. Air Forces. This one has a jettisonable extra fuel tank of bomb-like proportions.

R.C.A.F. Research

THE Royal Canadian Air Force has announced the appointment of A.V-M. E. W. Stedman to the newly created position of Director-General of Air Research. He will be succeeded on the Air Council by Air Comdre. A. Ferrier, who becomes Air Member for Aeronautical Engineering.

The duties of the Director-General will be entirely divorced from routine work of the department and the officer will devote his time entirely to the study of research and development work in close collaboration with the National Research Council.

This organisation is intended to make possible the introduction into service, with a minimum of delay, of new devices and new patterns of weapons.

Help from Britons Abroad

IN the course of a "Bomber Week" organised by the British Community Council in Portugal the sum of £40,000 was subscribed by the members of the British Colony there. It is not a large colony, even though its numbers have been increased by a temporary population of refugees and diplomatic and consular officials who were forced to flee from the overrun countries.

The effort, therefore, is quite creditable. The largest individual contribution was £10,000, while there were three of £5,000, one of £2,000, and four of £1,000. The money collected was either outright gifts or else loans of varying kinds—National Savings Certificates, etc.

This "special effort" is quite apart from the very many other funds in connection with the war, all of which are fed by considerable voluntary contributions from the British Colony in Portugal.

In late 1940 and early 1941 the Colony ran a Spitfire Fund, which brought in £17,000, not a little of which came from as far afield as the Azores and Madeira.

Books for Airmen in Hospital

NO fewer than 1,198,533 books have been distributed by the British Red Cross and Order of St. John Hospital Library to Service hospitals in this country and overseas since the war began until the end of last month, and of these, 22,528 have gone to Air Force hospitals at home and 446 to the R.A.F. in Russia.

Some idea of the magnitude of the task of providing reading matter for our sick and wounded Service men and women is conveyed by figures just issued from their headquarters at 48, Queen's Gardens, London, W.2, which disclose that more than 800 voluntary librarians are working in hospitals in England and Wales alone, while the destinations of books sent abroad range from Iceland and the Faroes to Aden, Bagdad and the Far East. Even St. Helena received 370, while 13,930 went to hospital ships.

The vast majority of the books have been obtained by collections and appeals all over the country, but during the past two years more than 15,000 books and nearly 6,000 paper-covered books have been rebound at their binding room at Belgrave House.

Needless to say, books and magazines are still urgently needed.

NORWEGIAN FIGHTER SQUADRON

Another R.N.A.F. Unit Becomes Operational : Canadian-trained Squadron with Spitfire Vs Under Fighter Command

(Illustrated by "Flight" photographs)

A cannon-armed Spitfire receives its Norwegian insignia. Other than this flag the machines carry the ordinary R.A.F. markings.

NORWAY is a thinly populated country where hard work provides the only means of subsistance and, as is usual in such countries, the standard of morale and patriotism is very high.

After the invasion by Germany in 1940, all who could get away came to this country to carry on the fight. Officers of the naval air force flew their aircraft to the Shetlands, and the army air force personnel escaped either westward by boat or eastward by land, as opportunity afforded. Other young fellows have continued to escape since then, and quite a number of the pilots of a Spitfire squadron which we visited recently were living in Norway up to a year ago. These later arrivals know conditions under the German jackboot, and with quiet voices will put anyone wise who thinks that the tales we hear of the Gestapo and German cruelty are but propaganda stories put out to work up a hate.

Some of the escapes make interesting reading. For instance, the commanding officer of this new Squadron, who was in the Norwegian army air force, got away in a trawler with 13 others. After having eluded the German coast watchers, they were spotted by two Heinkel 111s and bombed from a low height. Near misses damaged the steering gear and they had to put in at a lonely island for two days before they found a small fishing boat to take the place of the trawler. Setting off again at dusk they spent three days and nights in this open boat and drifted many miles north of their course, owing to a faulty compass. Here luck was with them as they fell in with a Royal Naval convoy proceeding to occupy Iceland. A new compass was borrowed and the journey finished.

Another journey to England, by a young pilot, took nearly eight months. It was by way of Sweden into Russia; a ten-day railway journey across Russia to Vladivostok; ships to Tokyo, Australia, South Africa and finally to England. But not quite

(Left) One of the Norwegian pilots in his grey-green army uniform before leaving Norway. In the background is the famous frozen lake airdrome from which the Gladiator squadron operated until no machines were left serviceable.

(Below) An armourer rearming the Brownings and Hispano cannons in the port wing of a Spitfire V. This photograph shows the length of the 20-mm. cannon and emphasises the difficulties encountered in stowing it in the thin wing of a Spitfire.

A little showmanship to please the visitors. Two Norwegian Spitfires indulge in a game of "follow my leader."

finally, because he was promptly dispatched to Canada for flying training, and only arrived back in this country a short while ago.

Training Scheme

The training in Canada is carried out at the expense of the Norwegian Government (the revenue comes mostly from the lease of oil tankers and other shipping to the United Nations) at "Little Norway," which used to be the Toronto Island Airport. It is now equipped with barracks, messes, school buildings and a hospital. Training at "Little Norway" began in 1940 and, in like manner to our Commonwealth Air Training Scheme, the fully trained men are sent to this country and posted to operational units.

The Commander-in-Chief of the Royal Norwegian Air Forces is Rear Admiral Hjalmar Riiser-Larsen, the explorer, who was second in command of the Amundsen-Ellsworth expedition by aircraft to the Arctic in 1925, and also took part in the Amundsen-Ellsworth-Nobile airship expedition across the North Pole in the following year. In 1928 he flew from Spitsbergen to search for survivors of Nobile's "Italia" expedition when the Italian explorer met disaster in an attempt to reach the North Pole. He also commanded the search for Amundsen when the Norwegian explorer was lost trying to bring help to the Italians. Admiral Riiser-Larsen escaped from Norway in 1940, and reached London by way of Moscow, the Balkans and Italy.

At the moment there are three squadrons which are fully operational. One is a naval squadron flying Northrop N.P.3 seaplanes from an Iceland base under Coastal Command. This unit was formed in April, 1941. By the end of July in the same year the first all-Norwegian army fighter squadron was established with Hurricanes under R.A.F. Fighter Command. It was later given Spitfires and is still in England. The third squadron also belongs to the Norwegian army and is equipped with cannon-armed Spitfire Vs. It has been operational for just a month, and while, of course, as a squadron it has yet to gain experience, the C.O. has been flying with an R.A.F. fighter squadron for some while. It is while making fighter sweeps and on bomber escort duty here and during the fighting in Norway that he has gained the necessary experience of flying against the enemy to nurse his new squadron through that difficult period which changes a first-class flying unit into a first-class fighting unit.

Home from Home

The Norwegians take their national characteristics with them wherever they go, and this is revealed by a peep into the pilots' room by anyone who has travelled in Norway. In the same way that bus and tram tickets are not just dropped on the floor or the pavement in Norway, so the floor of the dispersal hut is not littered by cigarette packets and stub ends—that is, it was not so until the Press arrived. On a table in the centre of the room is a most treasured possession. A miniature silk flag of Norway which was brought over by one of the officers. It immediately took one back to Scandinavia where they have the delightful habit of putting on the table miniature flags of the country

A private conference between the pilot and the ground crew on the virtues of the newly acquired cannons.

A Spitfire V taxies out from its dispersal point to the take-off runway. Ground crews take the same pride in the achievements of their particular pilot and machine as do their R.A.F. colleagues.

ER SQUADRON

from which the guest hails. The fireplace is, of course, of the usual open brickwork as fitted in all our dispersal huts and not the many-tiered, highly decorated, cast-iron structure so often found in the wooden houses of Norway.

On the walls are pictures of typical Norwegian scenery, so lovely and tranquil that it brings home to one just how wicked the Germans were ever to import death to its peaceful places. We asked if they had any grouses. No, there were no grouses. They were part of a nation at war. They were luckier than their people at home because they had been supplied with a very good weapon in the form of a Spitfire V and trained to use it. It was much harder for the people in Norway to keep up the fight.

Our final question was, "How do you get on with the English food?" Still struggling to be polite, they answered with a sad smile, "Why do you always just boil everything?"

The Spitfires are in good "hands." A dive and zoom across the tarmac to show the paces of one of the few remaining eight-gun models.

(Right) Ever critical of their fellows, ground crews watch other machines get away at the sound of the alarm.

The fishing boat in which the C.O. and 13 others escaped from Norway.

In the dispersal hut. The silk Norwegian flag on the table is a treasured possession brought from the homeland.

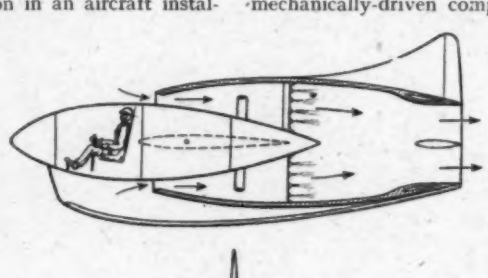
NEW IDEAS ON PROPULSION

French and American Schemes Employing Steam Turbines

NEWS has now reached us that the Breguet Aircraft works at Toulouse is building an experimental jet-propelled machine to the designs of R. Leduc. This French engineer is well known for his work in connection with the problem of jet propulsion. As reported in the fourth article on the subject appearing in the October 9th, 1941, issue of *Flight*, Leduc patented a thermal jet system in the year 1933. According to *Inter Avia*, the new experimental type is basically similar in principle to the Caproni-Campini machine, but with one important exception. Whereas the Italian craft uses a standard type of air-cooled radial engine to drive the air compressor unit, Leduc employs a steam turbine for this purpose. Of the VUIA type running at 3,000 r.p.m. under a steam pressure of 1,910 lb. per sq. in., the turbine is estimated to develop 1,200 h.p.

Experiments, presumably on the test bed, are claimed to have given satisfactory results. No details are yet available, however, of either the boiler or the necessary condenser plant. Obviously, the steam system would have to operate on a closed cycle. Condensing raises further problems which are not easy of solution in an aircraft installation. The condenser would most likely be placed in the main air stream so that heat transferred from the steam would be usefully absorbed for the propulsive jet. The development of a jet-propelled aircraft employing such a system will be watched with intense interest by designers throughout the world.

According to present-day standards it would not seem possible for the rate of fuel consumption to be as low as that of an internal combustion engine doing the same work. The projected speed of the new machine is estimated to be in excess of 310 miles an hour.



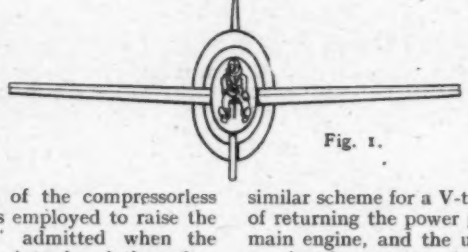


Fig. 1.

Earlier Projects

Leduc's earlier designs were all of the compressorless type in which a divergent duct was employed to raise the pressure of the "relative wind" admitted when the machine was in motion. Fuel was introduced through a comparatively large number of nozzles disposed across the main stream, as shown in the diagram (Fig. 1). Combustion of the fuel would therefore be relatively inefficient owing to the low degree of compression attainable, and consumption might be expected to be inordinately high.

Fig. 2 is a sketch of the model of a Leduc design which was exhibited at the Paris Salon de l'Aviation in 1938. This mid-wing monoplane with a fuselage of streamline form was a somewhat fanciful conception of "the machine of the future." The descriptive notice exhibited alongside the model, with the characteristically light-hearted abandon of the Gallic race, informed the visitor to the Salon that with a wing area of 16 sq. metres, a weight of 2,000 kilogrammes

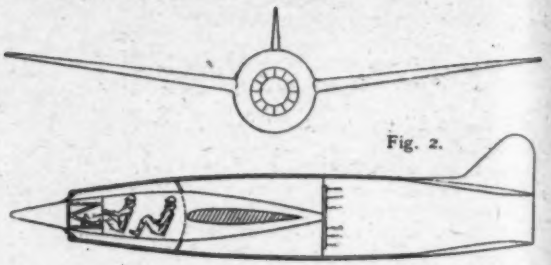


Fig. 2.

and an output of 14,000 h.p., the machine would have a speed of 1,000 kilometres per hour and a ceiling of 30 kilometres. There is no evidence that this design was taken beyond the model stage.

In the *Flight* article referred to earlier, it was suggested that such compressorless schemes of propulsion, whilst admittedly ingenious, were somewhat impracticable ideas of obtaining something for nothing. Some form of mechanically-driven compressor appears to be necessary, and the latest project of M. Leduc is a striking confirmation of this point of view.

Ambitious American Schemes

Four different arrangements of power units are disclosed in a recently published American patent in the names of Igor I. Sikorsky, M. E. Gluhareff and R. W. Griswold and assigned to the United Aircraft Corporation. The declared objects are to conserve engine power by the utilisation of waste heat, to improve engine cooling, and to enhance the aerodynamic characteristics of the wing section. Fig. 3 shows a typical layout, while other arrangements include a similar scheme for a V-type, liquid-cooled engine, a method of returning the power generated by the waste heat to the main engine, and the use of the auxiliary power to drive an electric generator for cabin heating.

Referring to the illustration, the radial engine A is enclosed in a cowling and the cooling air is drawn in by way of the central forward aperture by the suction of blower B. The air passes between the cylinders to remove excess heat, and is led into a chamber C formed by the leading-edge of the wing. Here it may be passed along the leading-edge to impart heat and prevent ice formation. The blower is driven by means of an exhaust gas turbine D and a steam turbine E operating on a common shaft. The gas turbine is connected directly to the exhaust conduit of the engine, whilst the steam turbine is driven by steam supplied from a boiler F heated by the efflux of the gas turbine. Steam leaving the turbine is passed through a condenser G and the condensed fluid is returned by pump H to a storage tank or directly to the boiler, as shown.

From the leading-edge chamber the blower delivers the air to a mid-wing chamber J, where it is forced through the condenser into an internal duct K. This communicates with a spanwise slot L located to the rear of the upper surface of the wing.

It is claimed that such an arrangement converts practically all the heat of the exhaust gas into mechanical energy which is utilised for

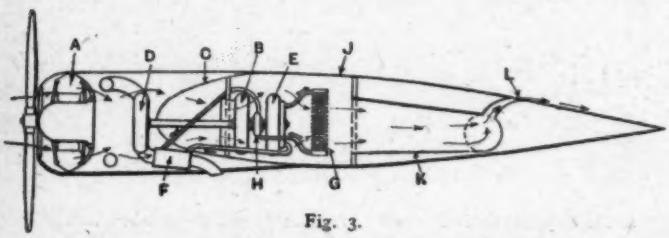


Fig. 3.

NEW IDEAS ON PROPULSION

cooling the engine and increasing the aerodynamic efficiency of the wing. A jet of air forced at high velocity from the rearwardly directed spanwise slot adds its energy to the air flowing along the rear portion of the upper wing surface.

By raising the velocity of the airflow along the upper surface, the area of diminished pressure may be increased, and any tendency of the airflow to break away from the surface near the trailing-edge may be materially delayed.

The proportion of the potential energy of the fuel supplied to the engine which is converted into useful work may, it is suggested, be greatly increased, thus permitting a substantial improvement in the ratio of the size and weight of the power plant to the speed and load-carrying capacity of the aircraft. As specific fuel consumption is generally high, any improvement in efficiency is to be welcomed.

G. S.

Gipsy Longevity

AFTER consultation between the Directorate of Repair and Maintenance and the Training Command, the Ministry has agreed that the life between overhauls of the Gipsy Major engine should be increased to 1,260 hours—and with no intermediate top overhauls!

The overhaul period of the Gipsy One engine when introduced in 1927 was 300 hours. Later it was increased to 450 hours. For the Gipsy Two, the inverted Gipsy Three, and the Gipsy Major when it was introduced in 1932, the overhaul period was 450 hours. In July, 1933, the Major was extended to 750 hours, and in August, 1937, it was extended again to 1,000 hours.

As a matter of fact the R.A.F. have been working to the routine of 900 hours, 100 hours less than the civil approval, but now the R.A.F. have themselves gone up to 1,260 hours.

This is not only a record for any engine in the R.A.F. but in all probability a world record.

Many thousands of these engines are now in service.

Models Aid R.A.F. Fund

A VERY interesting exhibition of aircraft models was held in the Ritz Cinema, Richmond, Surrey, during last week, in aid of the R.A.F. Benevolent Fund.

The show, organised by Mr. H. White, an A.T.C. instructor, was in two sections in the circle vestibule, one part being devoted to flying and scale models built by amateurs, while the other displayed a range of professionally made scale aircraft lent by Woodason Aircraft Models.

The amateur section included some beautifully made aircraft in full detail, while the flying models were of different types, including towed gliders. A feature of the exhibition was the daily demonstration given by Mr. White in building a flying sea and land plane, the machine to be auctioned at the end of the week on behalf of the R.A.F. Fund.

Twenty scale models, perfect in colouring and detail, were on the Woodason stand, and they formed a small part of the special models supplied by this firm to the Government. These exhibits are also used for filming purposes, and a set of large photographs near the stand demonstrated how remarkably effectively models can be used to take the place of the actual machines.

Reproductions of *Flight* technical drawings of engines and aircraft, and also *Flight* identification charts of British, American and enemy aircraft, were also exhibited.

The show resulted in an excellent contribution to the R.A.F. Fund, and was much admired by visitors to the cinema. Such local cinema exhibitions have, in fact, proved consistently successful, both in regard to money raised by voluntary collections, and in the interest shown by visitors.

Air Training Conference

CAPTAIN H. H. BALFOUR, Joint Under-Secretary of State for Air, is to head the United Kingdom delegation to a conference, to be held in Ottawa in May, in connection with air training.

Announced by President Roosevelt and the Prime Minister of Canada, it is to be a conference of representatives of the United Nations who have air training programmes in the U.S.A. or Canada.

The matter was mentioned in the Commons on April 23rd, when Mr. Simmonds asked Mr. Churchill if His Majesty's Government had been invited to attend the conference and, if so, what reply had been given.

The question was answered by the Deputy Prime Minister, Mr. Attlee, who said that the Government had warmly welcomed the opportunity to send representatives to a conference which they felt sure would promote still closer co-operation in air training between the United Nations.

In reply to a further question, Mr. Attlee assured the House that the conference had not been necessitated by any delay in air training, and that there was, in fact, no question whatever of any delay.

EMPIRE AIRMAN: British, Indian and American air force personnel are operating in Burma. Here is an Indian Lysander pilot with the Tiger of Konkan painted on the fuselage.

Thirty-sixth of the Second Series

FRIEND or FOE?

Rival Radial-engined Fighters : Vanguard and Fw 190

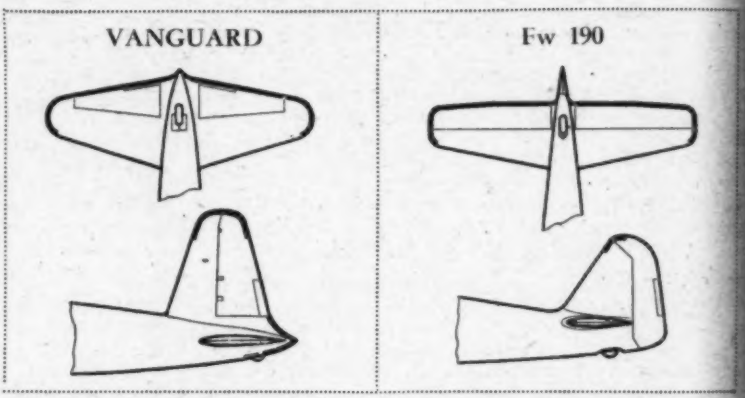
VULTEE VANGUARD. Large, symmetrically tapered fin and rudder with broad apex. Tailplane similar but has small round tips.

ALTHOUGH its operating speed is only in the region of 300 m.p.h.—not too fast by present-day standards—the ten machine guns with which the Vultee Vanguard is fitted makes it one of the most heavily armed of the American single-seater fighters. The first of the type was handed over to the R.A.F. early last year in Canada, although an order for 100 Vanguards originally placed by Sweden was transferred to Great Britain nearly 12 months previously, when the invasion of Norway made their delivery "next door" hardly possible. Those ultimately acquired by the R.A.F. differed in having a fin and rudder of somewhat lower aspect-ratio from the prototype.

The Focke-Wulf Fw 190, which has frequently figured in the news lately, is Germany's latest design in single-seat fighters, and the use of an air-cooled radial engine instead of their famous Mercedes-Benz liquid-cooled in-line engine has come as a surprise. R.A.F. fighter pilots who have encountered it over Northern France report that its performance certainly does not appear to be an improvement on earlier German fighters.

In general dimensions and appearance these two aircraft are very similar, and once again it is by their tail groups that they can most readily be identified, as the accompanying illustrations clearly show.

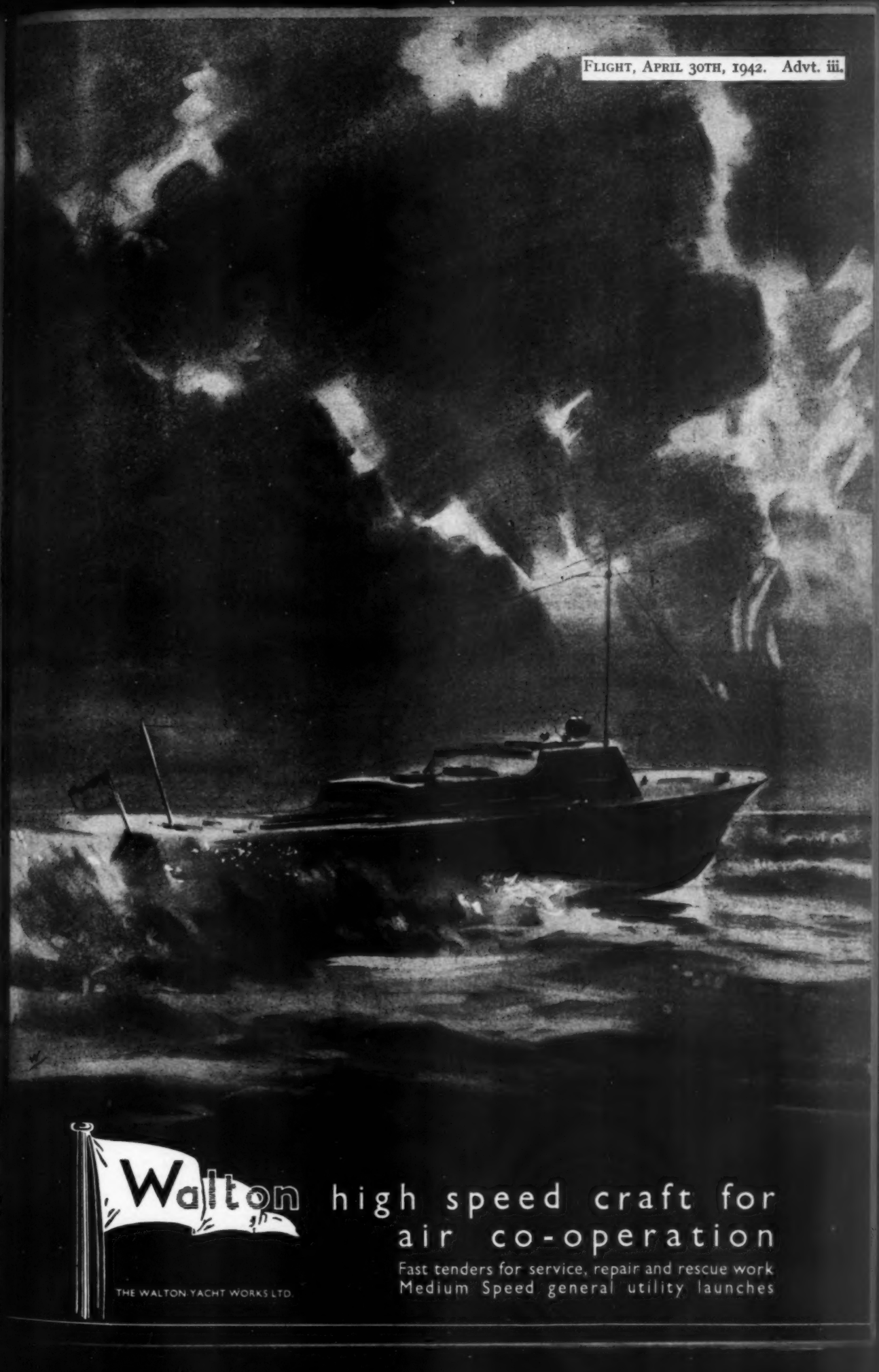
The fin and rudder of the Vanguard present a symmetrical outline, tapering equally on both edges and having a broad, rounded apex. Also, the trailing-edge of the rudder, which has a common base-line with the fin, blends into the pointed tail of the fuselage. The tailplane, which also tapers symmetrically on both edges, but has small round tips, similarly blends into the pointed stern and has inset elevators.



The Fw 190's tail assembly is not unlike that of the Me 109F except that both surfaces are of slightly higher aspect-ratio and the tailplane, which is level with the fin base, has squarer tips.

FOCKE-WULF Fw 190. High aspect-ratio tapered tailplane with rather square tips. Fin and rudder resembles Me 109F.

Next Week: Douglas D.C.3 and Curtiss Wright C.W.20.



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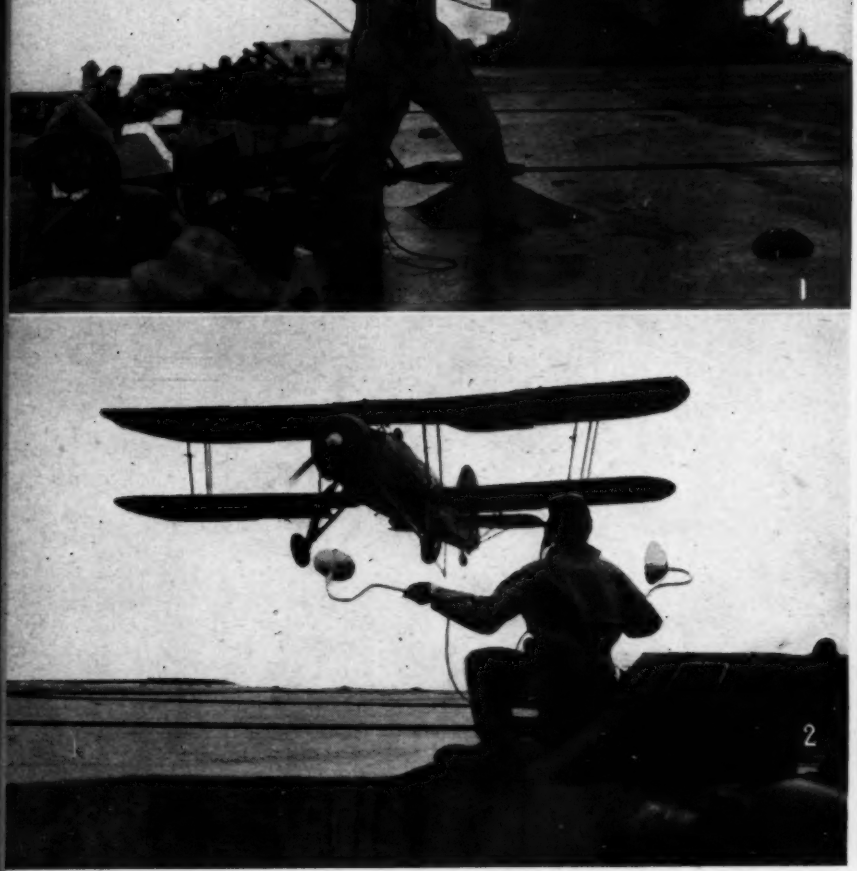
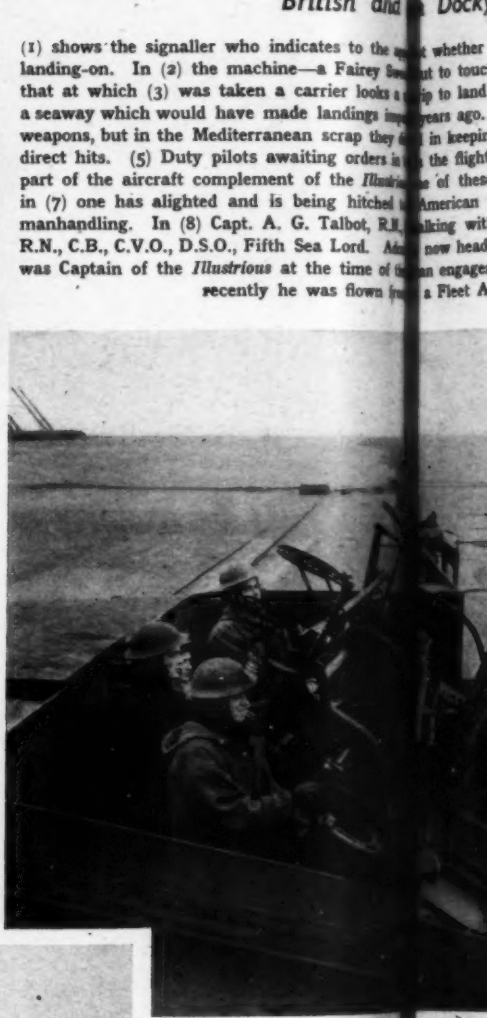
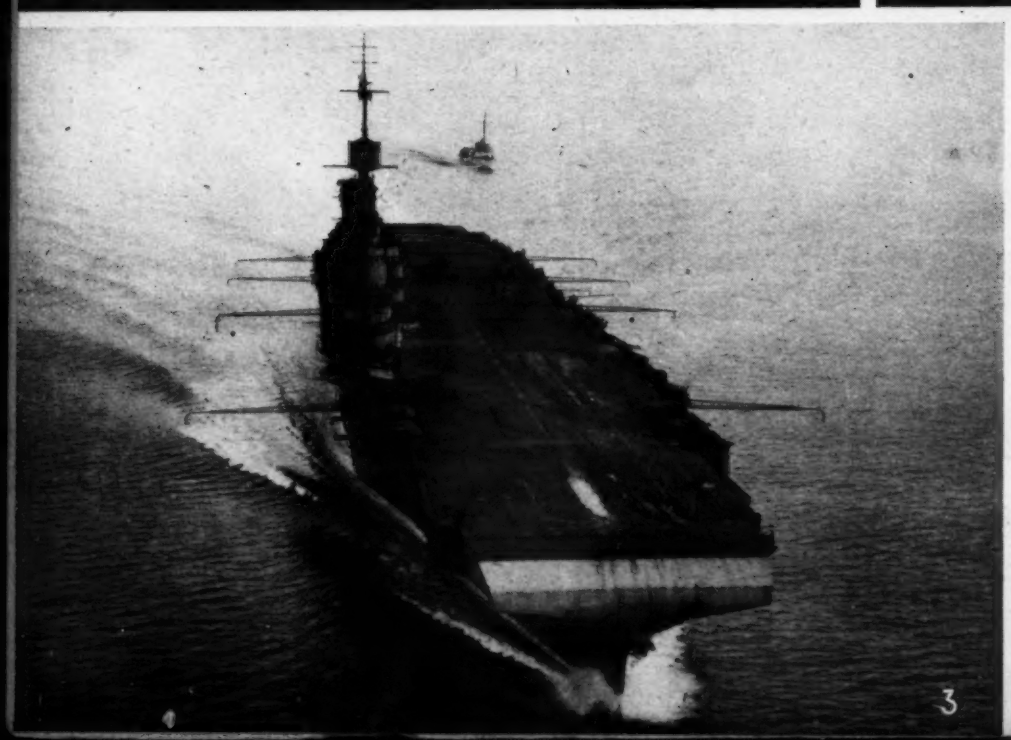
(1) shows the signaller who indicates to the a[ircraft] whether landing-on. In (2) the machine—a Fairey Be[a]ut to touc that at which (3) was taken a carrier looks a [s]hip to land a seaway which would have made landings imp[ossible] years ago. weapons, but in the Mediterranean scrap they [were] in keepin direct hits. (5) Duty pilots awaiting orders in [the] flight part of the aircraft complement of the *Illustrious* [Some] of thes in (7) one has alighted and is being hitched [to] American manhandling. In (8) Capt. A. G. Talbot, R.N. [is] talking wit R.N., C.B., C.V.O., D.S.O., Fifth Sea Lord. Ad[miral] now head was Captain of the *Illustrious* at the time of t[he] an engage recently he was flown fr[om] a Fleet A







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...to the ... whether or not he is at the right height for ...airey ... to touch down. From a height greater than ... looks a ... to land on ; yet pilots accomplish it safely in ...ings ... years ago. Pom-poms (4) are formidable A.A. ...p they ... in keeping all the dive bombers from scoring ...rders in ... the flight deck. Grumman Martlets now form ... *Illustr...* ...e of these machines is seen warming up, and ...itched ... American type of tractor now used instead of ...ot, R.N., ...lking with Rear-Admiral A. L. St. G. Lyster, ...rd. Ad... now head of the Royal Naval air service, and ...ne of t... ...n engagement. On this visit to his old ship ...own fr... a Fleet Air Arm aircraft.

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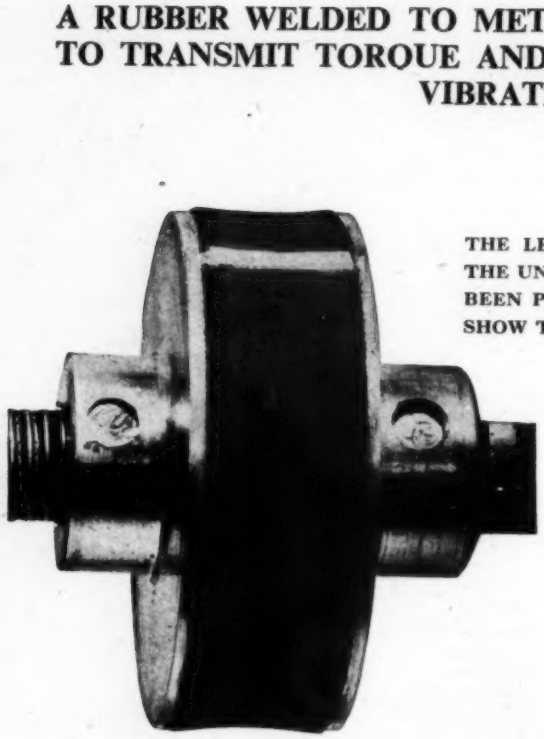
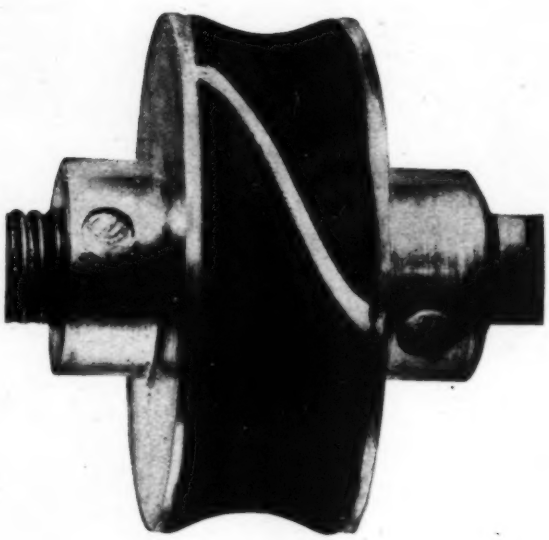


THE LEFT-HAND ILLUSTRATION SHOWS THE UNIT IN REPOSE, A WHITE LINE HAS BEEN PAINTED ACROSS THE RUBBER TO SHOW THE EXTENT OF THE DEFLECTION.

ON THE RIGHT THE UNIT IS SUBJECTED TO A TORSIONAL STRESS WITH *A DEFLECTION OF 50°*. NO SIGN OF SEPARATION OCCURS. THE WONDERFUL *METALASTIK 'RUBBER-TO-METAL' WELD* WILL HOLD UNTIL THE POINT WHERE THE RUBBER ITSELF TEARS APART.



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THOSE MYSTERIOUS DIVE-BOMBERS

Is Our Policy Too Inflexible? A Plea for Reconsideration

By F. C. SHEFFIELD

THE subject of dive-bombers has been very much in the forefront lately. In our issue of March 12th, 1942, we published the views of a writer who considered the Hurricane bomber, the Beaufighter, and the torpedoplane better value for money.

The present article is a plea for the dive-bomber, and although we do not altogether agree with the author we feel that his views are entitled to be studied.

EVER since tough film star Wallace Beery introduced to the general public the Curtiss "Helldivers" of the U.S. Navy, the dive-bomber has been a subject for speculation. Invested with thrills and glamour, it has been credited with a fantastic ability to destroy all manner of targets. The demise of the monster battleship was predicted as a consequence of its development.

Not a little mystery had become attached to the dive-bomber before the war began. This was largely on account of the lack of interest in the type displayed by our Air Command, while all the major foreign powers were building dive-bombers and developing the necessary combatant technique.

Ill-informed Comment

An enormous amount of ill-informed comment has been written on the subject, but never such a spate as in recent months. The terrible destruction effected by the German dive-bombers in Poland, Holland, France and other theatres of war had been noted. When accounts of Japanese dive-bombing were published there was renewed perturbation. This was not soothed by the appearance in the daily Press of contributions by "Our Air Correspondent" which still sought to convince that the dive-bomber was an ineffectual weapon and that the British policy was best for an A1 nation.

With the escape of the German warships through the Straits of Dover the matter came to a head. We attacked these vessels with high-altitude bombers and obsolete torpedo bombers. Our attack was unsuccessful; we suffered heavy losses, and the question "Why no dive-bombers?" naturally again arose. On the same lines as a one-time popular ditty, the answer was "Yes, we have no dive-bombers"; but it was not allowed to retain its disarming simplicity.

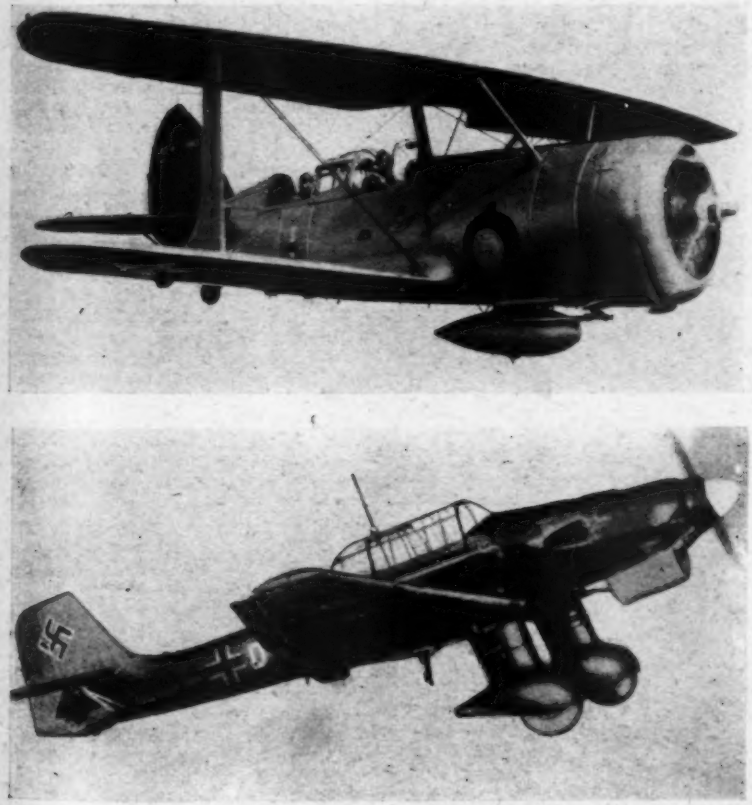
Varied Explanations

The "informed" apologists rushed into print with profound and sonorous explanations: (1) There was the weather. Never had there been such banks of cloud or such low visibility. The dive-bomber would have been useless. (2) Dive-bombers would have to descend to a low altitude and would be brought down by defensive fire from the warships. (3) As the velocity of a bomb delivered by the dive method is less than that of a bomb from a high altitude, it cannot pierce deck armour and destroy a warship except under fortuitous circumstances. (4) Dive-bombers are slow, poorly armed, and extremely vulnerable unless provided with an escort of fighters. Lord Trenchard said: "The dive-bomber is not new or terrible; indeed, it is a very inefficient machine in itself."

Finally, according to reports, one wing-forward of International fame broke away from the pack and scored a notable try for his side by thanking Heaven we had no dive-bombers, as they were obsolete. This try was discussed and criticised, but has yet to be converted. The arguments were gloriously mixed, and the resulting confusion was complete. The mystery deepened.

The Real Question

Every effort, it seemed, was made to force the issue along lines of "Fighters are better than dive-bombers," "Should we have fighters or dive-bombers?" or "Shall we bomb from high or low altitude?" Even if not intended, these served to divert attention from the real question, "*Why* have we no dive-bombers?" and to permit the inference that we could or should have certain types, but not all types. Surely, the actual needs of the situation are as stated by an American commentator on March 10th referring to reinforcements on the way to the south-west Pacific:



America was the first country to develop the dive-bomber. The upper picture shows the Curtiss SBC-4, with Wright Cyclone engine. The German Junkers Ju 87 in the lower picture made the name "Stuka" famous or infamous!

THOSE MYSTERIOUS DIVE-BOMBERS

"On the transports in the convoys are vital supplies, headed primarily by fighter planes and dive-bombers." "Vital" is the appropriate adjective. Both are necessary types for operations in that area.

The British Blackburn Skua (Bristol Perseus) diving with air brakes down.

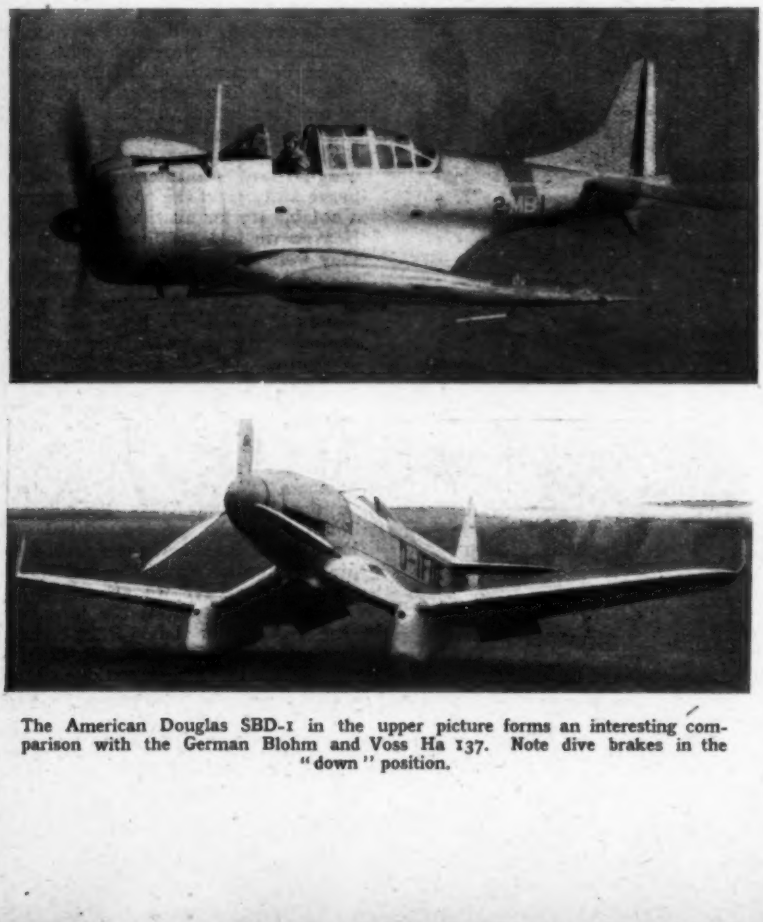
Value and Limitations

Then, again, the value and the limitations of dive-bombers are quite distinct in naval and land operations. As high-altitude (so-called "precision") bombing was more effective for large stationary targets on land it was suggested that it was similarly advantageous for small, mobile targets at sea. The dive-bomber, releasing its missile at 1,500ft., frequently fails to secure a direct hit, yet a high-altitude bomber is expected to achieve better results at 15,000ft. Fighters armed with suitable high-velocity shell guns may be more effective against tanks and even the smaller marine transport, but they cannot replace the dive-bomber for the destruction of railway junctions, embankments, cuttings, bridges and similar objectives on land or the larger vessels at sea. It should be remembered that modern dive-bombers, for example the Curtiss SB2 C-1, can carry a 1,000 lb. bomb.

The abuse which has commonly been hurled at the dive-bomber arises largely owing to insistent reference to the notorious German Ju 87. Using this old-fashioned, converted machine as a convenient Aunt Sally, dive-bombers as a type are contemptuously described as slow, heavy, ill-armed, and easy meat for our fighters. The Ju 87 is all these things, and doubtless even a Nazi would not deny it. Nevertheless, they served German purposes very well, enabled an obsolescent type to be usefully employed, and thus represented a real economy. Whether carelessly or deliberately, to use the Ju 87 as the "awful example" merely begs the question, creates confusion and delays arrival at a clear decision.

The Ju 88, and also the modern Italian, Russian and American dive-bombers, are different propositions, and both by speed and armament are better equipped to defend themselves. To continue prating about what we did to the Stukas in the Battle of Britain is to be living in the past. If history is to be invoked, remember the Stukas were for the Germans a useful instrument in the winning of the continent of Europe. Only to-day's and to-morrow's problems matter in the stress of total war.

Why such insistence on the fact that the dive-bomber can be shot down by modern fighters? It is not denied. The same charge applies to other types of aircraft. What we did to the Stukas in the Battle for Britain we also did to the precision bombers. The fighters' job is to win mastery of the air from the enemy, shoot down all opposition and maintain control of the air to permit operations by specialised machines in the air, on sea and also on land. In default of complete mastery of the air, heavy bombers, warships and supply columns on land each require a protective screen of fighter aircraft, yet no suggestions are made that we, alone in our wisdom, should dispense with these particular machines and equipment.



The American Douglas SBD-1 in the upper picture forms an interesting comparison with the German Blohm and Voss Ha 137. Note dive brakes in the "down" position.

Determined Pilots

It is stated that the dive-bomber, whilst in the dive, presents an easy target for the defender, and that ruthlessly determined, fanatical or suicidal pilots are required. We do not lack courageous and determined pilots, and the more sensational and dramatic attributes are generally called for by reasons of unsound policy or technique, or even the lack of policy or technique.

It required something more than courage again and again to penetrate

An Italian dive-bomber, the Savoia-Marchetti SM 85, with two Piaggio engines.

the defences at Brest in attempts to destroy the *Scharnhorst* and *Gneisenau*. More than courage was demanded of the pilots of the Swordfish torpedo bombers sent out forlornly against these vessels and their escort in the Channel. As Sir Roger Keyes stated in the House of Commons, "They had no chance of returning," yet we do not suggest the torpedo bomber, as a type, is of no particular use and is not required. Is the dive-bomber so markedly more vulnerable than a torpedo bomber?

According to reported practice, the torpedo is dropped from an altitude of from 25ft. to 100ft. at a range of about 1,000 yards, although this distance may be considerably increased. Aircraft speed is about 100 to 120 miles an hour. The dive-bomber has more freedom to manœuvre in approach, and can make effective use of any cloud cover. The run-in to the target may be at 10,000-15,000ft., spiralling down to 4,000-5,000ft. for observation and to get into position. A turn of 30 deg. to 40 deg. is taken for final direction, and the dive is then made at some angle, say, 70 deg., at a speed which will now, probably, be in excess of the 240 miles an hour which was employed by the old German Ju 87 machines. A modern machine should be capable of diving at a speed of at least 350 miles an hour.

Escape Technique

Usually the bomb or bombs will be released at about 1,500ft., as most of this height will be required to pull out of the dive. In this manœuvre, it must be remembered, the machine passes right over the target. Usually the escape is made by a turn and what is euphoniously termed "avoiding action." During the approach and the escape, suitable tactics make the dive-bomber a difficult target for anti-aircraft fire. When getting into position preparatory to the dive, speed is reduced, and this disconcerts the artillery. During the pull-out, elevation is continuously changing, and the time element is short (two to three seconds).

Only on the dive does the machine offer a reasonable target, and then only if suitable fragmentation or shrapnel shells are employed. In any case, the dive will only occupy a period of, say, six to seven seconds. In all probability, modern machines on a carefully worked out technique will improve these published figures.

Bombing is a development of artillery. The missile is transported and dropped on the target instead of being thrown at the target by a gun. It is a first pre-requisite that the missile, whatever its character, shall hit the target. High-altitude bombing has been developed to an art, but so many variables are encountered that, despite meticulous training of the aimer and the most ingenious sighting devices, it remains largely a hazard. Even for a stationary target there are the relative ground speed, altitude and angle of approach of the aircraft; the speed, direction and gustiness of the relative wind about the aircraft; speed and direction of possibly different wind strata at lower altitudes; possible rising or falling air currents; the release, initial unstable flight and eventual trajectory of the bomb to be allowed for.

Precision Bombing

Errors are possible in the co-ordination between aimer and pilot, and in the observation, estimation and calculation of the variables. In the case of lower winds or air currents these may not even be observable. When the target is small, mobile and rapidly manœuvrable, as a warship in open sea, some idea of the difficulty of securing a direct hit can be imagined. Early in the war the French published a table of probable bombing errors for horizontal launching at stationary targets from various altitudes and at various speeds. It may be assumed that the technique has since been improved, but merely to quote one instance gives an indication of the difficulty. For a bomb released from a height of 16,400ft at an aircraft speed of 155 m.p.h., possible errors are expected of 246 yards in direction and 268 yards for range.

Low-altitude bombing will reduce the number and the magnitude of the variables, but expose the aircraft to defensive fire and deliver the bomb at a relatively low velocity. Diving tactics seek to obtain the advantages and reduce the disadvantages of low-altitude bombing. The bomb is virtually delivered on the target and by diving at high speed the bomb is launched at an initial velocity which compensates to some extent for the lack of altitude.

In the recent past it was considered satisfactory to arrange for a diving speed which, in effect, would yield a bomb velocity at the target equivalent to a drop from 4,000 to 5,000ft. Modern machines and specially trained crews can undoubtedly improve on such figures. American machines are claimed to have been dived at over 600 m.p.h. In any case, the dive-bomber cannot be condemned solely on account of the lower velocity of the bomb. The cardinal virtue is its ability to deliver the bomb more accurately, and the most effective armour-piercing bomb is completely wasted if it misses the target.

Bomb versus Armour

It is the old naval problem of shell versus armour. When the Navy had guns of adequate range and accuracy but could not pierce the armour plating, it did not cry out that the gun was obsolete and not wanted. It improved the gun to increase muzzle velocity and developed special armour-piercing shells until the armourers were forced to invent improved protective plating. Furthermore, a self-propelling missile, the torpedo, was carefullly brought into practical use for special duties. In the air a similar persistency and adaptability is required. Better machines and better bombs must be developed to penetrate defensive equipment. If necessary the bomb velocity must be improved by rocket-type propellants or a genuine air-torpedo must be developed.

In regard to the naval use of dive-bombers, Russian opinions are of interest. The Soviet *Air Fleet News*, dated January, 1941, had an article

The German Junkers Ju 88 is complementary to the Ju 87 for dive-bombing. The engines are Jumo 211s in circular cowlings.

THOSE MYSTERIOUS DIVE-BOMBERS

"Dive-bombing in Sea Warfare." In this is was stated that, owing to the speed, manœuvrability and small size of maritime targets, a special technique of attack is entailed which favours the use of the dive-bomber. More recently, referring to the escape of the *Scharnhorst*, *Gneisenau* and *Prinz Eugen*, was the comment, "It is not believed in Moscow that these ships, when finally repaired, can play any decisive part in the Baltic, where they would be exposed to the danger of Russian dive-bomber attacks."

The American Vultee Vengeance has been ordered for Great Britain. It was designed from the beginning as a dive-bomber.

Naval Operations

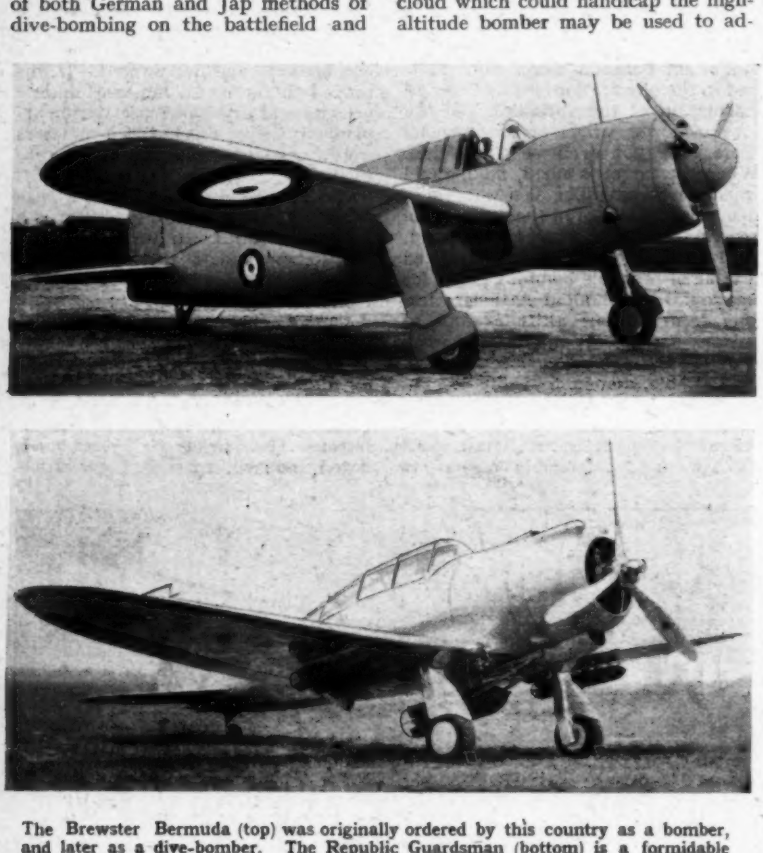
In the same issue of the serious Sunday newspaper reporting this view, the British correspondent, analysing what he termed the "Channel fiasco," stated: "Some have suggested that dive-bombers might have altered the result. This is nonsense. Dive-bombing would not have been possible in the visibility obtaining, and the losses against the big fighter opposition would have been enormous. Anyhow, dive-bombing has no effect against heavily armoured ships."

The Russians have direct knowledge of both German and Jap methods of dive-bombing on the battlefield and themselves make effective use of dive tactics for land operations. The latest news is that the Germans are employing waves of dive-bombers to blast Russian A.A. posts and airfields in an attempt to destroy the forces which are intercepting the air transports carrying supplies and reinforcements to the 16th Army trapped in the Staraya Russa sector. It is generally acknowledged that sustained dive-bombing is a most effective tactic for breaking the morale of troops.

Weather is beyond control or modification, but certainly low, broken cloud which could handicap the high-altitude bomber may be used to advantage by a dive-bomber. Also a dive out of the sun or an escape into the sun is a possible manœuvre by which the dive-bomber may foil ground or ship defences.

Admittedly the dive-bomber is a specialised weapon, but if a case can be made for the torpedo craft there would appear to be even more justification for the dive-bomber. Referring to torpedo bombers, Admiral of the Fleet Lord Chatfield wrote on December 14th, 1941, "If our ships must operate within reach of more effective shore-based aircraft than that which they have previously faced in the Mediterranean, then there are measures which can be taken no doubt to lessen the risk. . . . Moreover, if enemy ships venture to approach within range of our own shore-based aircraft, we can confidently expect that they will receive measure for measure. . . . If we rightly maintain our fullest confidence in the Admiralty and the Navy it will mean much to them, and it will, moreover, fortify our minds in anxious days."

The suggested fortification of the mind was rudely shaken only two months later when the German vessels steamed up the Channel. Nevertheless, there is no clamour that the torpedo bomber is obsolete or useless or that its special duties can be better effected by another type of aircraft. Instead we are promised a new and improved torpedo bomber.



The Brewster Bermuda (top) was originally ordered by this country as a bomber, and later as a dive-bomber. The Republic Guardsman (bottom) is a formidable modern American type.

American Dive-bombers

Of course, public anxiety has been somewhat allayed by the statement that America is going to send us some modern dive-bombers. Why we want them if, as claimed, dive-bombing is useless and a Hurricane adapted as a high-speed, low-level bomber or equipped with shell-guns for "tank busting" is a better proposition, passes comprehension. Our advisers should have the courage to stand by their professed opinions.

However, it should be noted that the announcement regarding the purchase of American dive-bombers does not represent any recent change of policy. These Vultee Vengeance dive-bombers were, according to

THOSE MYSTERIOUS DIVE-BOMBERS

the statement of Sir Archibald Sinclair on March 4th, 1942, ordered in June, 1940, "after the fighting in France had shown all the evidence to be in their favour." Before the war we paid no attention to dive-bombing, and when war started it needed the loss of Poland, Norway, Holland, Belgium and France to convince us that dive-bombers were necessary.

The French Debacle

At the Riom trial in March of this year the sorry story of the dive-bomber in France was disclosed. M. Daladier said that dive-bombers were exhibited at the Air Salon in Paris in 1938, but no one believed in their wanted, but up to the present I have not been asked to supply them."

In the hope of preventing the passionate supporters of the Hurricane or the Spitfire wasting time and paper in writing indignant protests, it is necessary to emphasise that this article is not an attack on the merits of these superb fighters. Neither should it be construed as an attack on high-altitude bombing, the big bombers or the long-range bombing policy. It is merely a plea for removal of the boycott of the dive-bomber. It infers, from the evidence which has appeared right across the world, that the dive-bomber should not have been ignored in the past and certainly should no longer be ignored. It suggests we should, by whatever means possible, build up adequate dive-bombing forces with the minimum delay.

The difficulties attendant upon such a late decision will be considerable, convertible to torpedo-carrying, the R.A.F. is not equipped adequately to duplicate the successes of the Japanese Stuka types. The R.A.F. could not exploit the short-lived ascendancy over Lower Burma by decisive operations against the Japanese ground forces, while Allied blows against Japanese warships are apparently confined to high-level bombing. This deficiency can be remedied by reinforcements from the United States, which specialised in dive-bombing before the Germans."

Delay is Dangerous

Speed is all-important. Total war has raced down the entire length of the Pacific at an unprecedented speed. In all matters, whether on land or sea, whether affecting the fighting forces, our productive forces or the civil population, we should keep a mind open and ready to seize and develop

Our Russian Allies have made good use of their Stormovik dive-bombers on the eastern front.

immense effectiveness, and that is why the Supreme War Council considered no measures to meet the danger. General Mittelhauser, commander of the French Army of the Alps, stated that the German introduction of the dive-bomber was one of the decisive turns of the war; that the dive-bomber stopped the British invasion of Norway; and that he warned General Gamelin of the danger from the Stukas. At this, M. Daladier intervened to state that the French General Staff had turned down the dive-bomber as a military weapon, and refused to have them built even though most generals wanted them.

Unfortunately, we placed our orders with an American concern which did not possess the facilities to build them. So we financed the erection and equipment of a brand-new plant for the purpose. Twenty-one months have passed and there is no doubt it is a fine plant, but we have not yet received the machines. In July, 1941, Lt. Col. Moore-Brabazon, then Minister for Aircraft Production, stated in the House of Commons: "It is not for me to impose upon the Army any particular type of machine. . . . It may be that dive-bombers will be but nevertheless must be overcome. A mere token force sufficient for the production of a soporific news reel is not enough. The staggering loss early this month of the cruisers *Dorsetshire* and *Cornwall*, and the aircraft carrier *Hermes* in the Indian Ocean, should completely dispose of what one newspaper terms the "buffoon statements about the ineffectiveness of dive-bombing." Japanese dive-bombers were largely, if not exclusively, responsible for these sinkings.

Lessons from the East

At a recent by-election, Air Chief Marshal Sir Arthur Longmore stated he would, if elected, press in the House of Commons for ". . . construction of dive-bombers and tank-busters for use wherever local air superiority is gained."

Only last week came the following message from the East, which merits consideration: "Although Hudsons and Blenheims were useful to Burma and will be valuable to India, the Allies apparently need United States dive-bombers to ensure Japanese discomfiture. Whereas the Hudsons and Blenheims are capable of shallow dive-bombing, and the Beauforts are immediately any method or any weapon, however specialised, that can usefully assist our effort.

We can afford to have no blind spots or taboos. Consideration should be given to all types of bombing, high-altitude, low-level, dive-bombing and also climb-bombing. There is no reason why even a dive-bomber should not possess a certain versatility and be capable of useful adaptation for other duties. The Junkers Ju 88 is also used for precision bombing. Dive-bombers could similarly be adapted as long-range fighters or even, possibly, a basic type could serve for the dive-bomber and the shore-based torpedo bomber, but these are mere details. An open, alert mind, freedom from restriction, and readiness to adopt new weapons and new tactics are the prime essentials.

It is fortunate that our American Ally has fostered the development of dive-bombers and is producing what are probably the best examples of the type. Soon they will be available to us and we can depend upon our pilots to make effective use of them. Napoleonic, Crimean, pre-war, or even 1940 habits of thought must not be allowed to hinder their operations.

IN PARLIAMENT

Extracts from Proceedings in the House on Matters of Interest to the Air Forces and the Aircraft Industry

AMONG the major activities in Parliament recently was the issuing of the now celebrated White Paper which sets out, under the title of "The Organisation for Joint Planning," the organisation by which the conduct of the war is controlled, and which included a diagram arranged in the form of a "genealogical tree," showing the constitution of the executive machinery.

As will be seen from the diagram, there is at the head of things a Chief of Staffs Committee which is responsible direct to the War Cabinet in the capacity of professional advisors. This is constituted as follows:—

Chairman: Gen. Sir Alan Brooke. Members: Admiral of the Fleet Sir Dudley Pound, Air Chief Marshal Sir Charles Portal (Chief of the Air Staff), Maj. Gen. Sir Hastings Ismay (representing the Minister of Defence and directing the Defence Secretariat), Vice-Admiral Lord Louis Mountbatten (Chief of Combined Operations)—present when major strategical issues or specific combined operations are under discussion.

But as every member of this committee also has the task of directing the activities of his own individual Service, each Chief of Staff has a Vice-Chief of Staff to whom certain matters can be delegated when necessary, and the Vice-Chiefs hold regular committee meetings for this purpose. The personnel of the Vice-Chiefs of Staff Committee, whose chairman varies according to the nature of the business delegated to it, is composed of Vice-Admiral H. R. Moore (Vice-Chief of the Naval Staff), Lt. Gen. A. E. Nye (Vice-Chief of the Imperial General Staff), Air Chief Marshal Sir Wilfrid Freeman (Vice-Chief of the Air Staff).

The White Paper makes it clear that the Joint Staff advocated from time to time in Parliament and the Press has in fact existed for many years. It has been progressively reorganised and expanded in the light of war experience. It consists of specially selected officers of the three Services who live and work together in the same offices. Thus they learn to think and act in terms, not of three separate units assisting one another for a common end, but of a single fighting unit animated by the same spirit and the same conception of a single task. At their service for information and advice are the three Departmental Staffs of the Navy, Army and Air Force.

Directors of Plans

The Joint Planning Staff is under the direction of the three Directors of Plans of the Admiralty, the War Office and the Air Ministry. These officers divide their time between their own Ministries and the Joint Planning Centre. Each of the Planning Sections shown in the diagram consists of specially selected officers who work as a team in every sense of the word. They share not only the same tasks but the same office. They not only mess together but sleep in the same building. They are available for consultation at any hour of the day or night.

The duties of the various sections may be broadly defined as follows:

(a) The Strategical Planning Section, under the direction of the Chiefs of Staff and Directors of Plans, keeps the general situation under constant review and prepares appreciations of the situation from time to time, with recommendations as to the action that we should adopt.

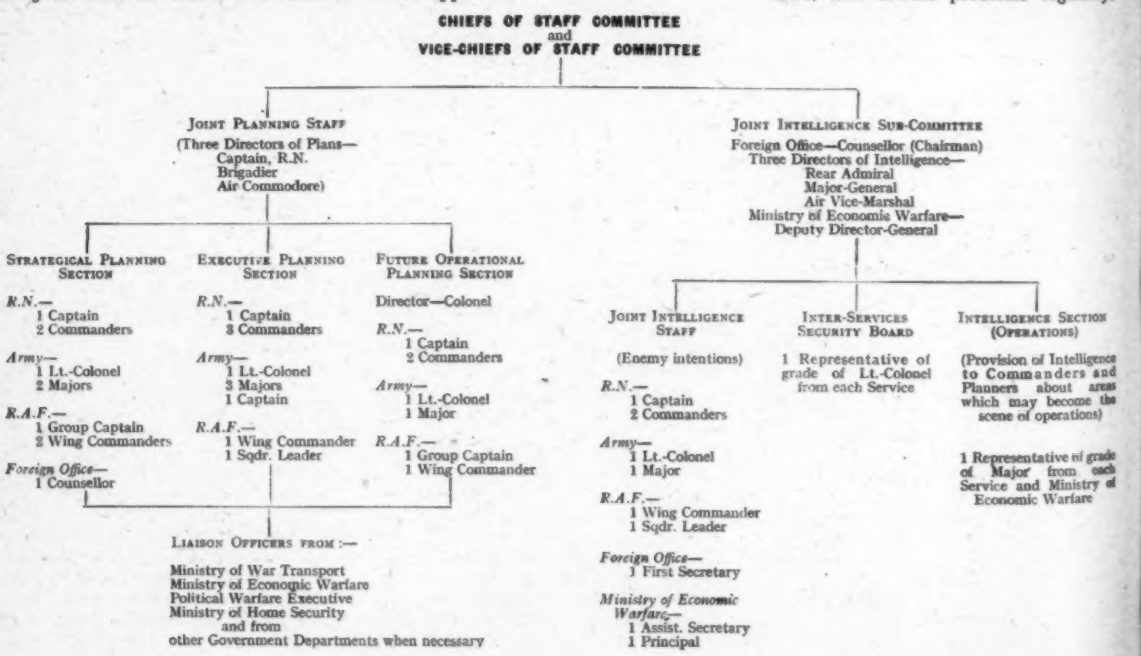
(b) The Executive Planning Section is charged with concerting ways and means of putting into effect plans which have been approved.

(c) The Future Operational Planning Section is not concerned with current work, but concentrates on the preparation of future plans, even though these may not be immediately within the range of practical politics. Thus they are not rigidly bound by limitations of the Forces, transport and other resources immediately available.

The Joint Planning Staff is, of course, primarily concerned with military plans, but in "total war" other considerations, political, economic, etc., have to be taken into account. Consequently, the Foreign Office have a permanent representative on the Joint Planning Staff, while the Political Warfare Executive and the Ministries of War Transport, Economic Warfare and Home Security each have liaison officers who are called into consultation.

The Joint Intelligence Sub-Committee consists of a representative of the Foreign Office (chairman), the Directors of Intelligence of the three Service departments, and the Deputy Director-General of the Ministry of Economic Warfare. These officers work on the same lines as the Directors of Plans, i.e., part-time in their own Ministries and part-time as a team. They have under them joint staffs of the three Services, Foreign Office and Ministry of Economic Warfare, as shown in the diagram. These work on exactly the same lines as the various sections of the Joint Planning Staff. Broadly speaking, it is the responsibility of the Joint Intelligence Sub-Committee to collate and assess all information about the enemy, and, in particular, to prepare appreciations of the most likely course of enemy action from time to time.

The Joint Planning Staff and the Joint Intelligence Sub-Committee work hand in hand, and discuss problems regularly.



JAPAN'S AIR POWER

New Developments : Axis Co-operation : The Organisation of the Air Arm : Training : The Importance of the Naval Air Arm

(Continued from page 397, April 23rd)

THE Japanese technical science, inspired as it is by the work of other nations, has hitherto developed very little original design. It is reported that a new type of reconnaissance aircraft has been developed by the Mitsubishi Company and employed in the fighting for Malaya. This type of aircraft is said to have good manœuvrability and a better speed than any other Japanese aircraft. It is possible that its construction will have a profound influence on the future development of Japanese aircraft types. That the Japanese attach considerable importance to this new type is demonstrated by the fact that the two designers have been decorated by the Japanese Government and awarded a prize of 20,000 yen.

Hitherto the Japanese aircraft industry has never produced a type which would be pioneering in the development of aircraft design. In fact, the tendency for emulation is displayed both in the construction of engines and airframes.

The Kinsei engines, which seem to be increasingly popular, are based on the technical development which followed the acquisition of manufacturing rights for the Gnome-Rhone and Siddeley engines.

Looking carefully at the various types of Japanese aircraft, one has no difficulty in tracing their pedigree. This is particularly striking in the four-engined bombers of the Army Air Force, of which two types are reported to be in existence. The Mitsubishi 92 long-range bomber, powered with four Mitsubishi A.14 "Kinsei" 14-cylinder twin-row air-cooled radials of 950 h.p. each, strongly resembles the old Junkers G 38. The Army 96 four-engined long-range bomber, which has a speed of 260 m.p.h., range of 2,200 miles and a maximum bomb load of 3,000lb., is a close version of the Fiat B.R.20. (Incidentally, the latter had a very short life in the Battle of Britain.) Whether these types, particularly the Mitsubishi 92, are still considered by the Japanese as first-line equipment is impossible to say. But, if this obsolete Mitsubishi 92 has been taken off the equipment list of the Army Air Force, it is quite likely that a more modern type of a four-engined bomber has since been developed. It is feasible that the prototype of the Douglas DC 4 four-engined

(Below) Kawanishi T97 flying boat, a more recent type of Japan's naval air arm. (Right) Mitsubishi T96, an extensively used dive-bomber.

NAVY — FIGHTERS

Type	General Description	Dimensions : Span, Length, Wing Area	Power Plant	Performance	Armament
Mitsubishi T96/2a	Single-seater, low-wing monoplane with fixed divided type undercarriage and spats. Flaps and wing root fillets, rounded fin and rudder. Cockpit with head fairing extending along fuselage, merging into fin, pointed fuselage and projecting beyond tail unit. Metal construction.	36ft. 24.5ft. 170 sq. ft. (?)	1 Kinsei air-cooled radial of 730 h.p. at 9,000ft. 3 blade metal airscrews.	Normal weight 4,300 lb. Maximum speed 250 m.p.h. at 9,000ft. Service ceiling 31,000ft. Cruising speed 217 m.p.h. with a range of 440 miles or 2 hours on 80 gallons.	2×7.7 mm. fixed forward fuselage. Possibly 2×7.7 mm. fixed forward wings.
Nakajima 95 ...	Single-seater fighter of mixed construction. Equipped for blind flying. First produced in 1935 and probably copied from the 1928 Boeing P-12. Almost indistinguishable from the early Nakajima 90 and 94 fighters	—	1 Kotobuki 9 cyl. radial of 500 to 600 h.p.	Maximum speed 215 m.p.h. at S.L. Climbs to 9,000ft. in 5 min. Range 3 hours. Ceiling 28,000ft.	2 × 1 m.g. firing through the airscrew hub, fixed in the fuselage. Light bombs up to 80 lb.
Mitsubishi T97 ...	Single-seater. Likely to be the Mitsubishi T90/2B with minor modifications. Single-engine, low-wing monoplane with retractable undercarriage.	40ft. 25ft. 170 sq. ft. (?)	9-cylinder air-cooled radial of 650 h.p. at 9,000ft. 3-blade variable pitch airscrews.	Normal load 4,500 lb. Maximum speed 265 m.p.h. at 11,000ft. Service ceiling 30,000ft. Cruising speed 225 m.p.h. with a range of 590 miles, or 2.6 hours, on 80 gallons. Maximum tankage 110 gallons.	2×7.7 mm. fixed forward fuselage.
Nakajima T97 ...	Single-seater. Basically resembles the Mitsubishi T96 fighter. Performance and range slightly improved on the preceding Mitsubishi T97.	35.5ft. 25.6ft. 160 sq. ft.	One Nakajima air-cooled radial of 750 h.p. at 13,000ft. 3-blade metal airscrew.	Normal load 4,300 lb. Maximum speed 270 m.p.h. at 15,000ft. Ceiling 32,000ft. Cruising at 233 m.p.h. Range 460 miles.	1×7.7 mm. fixed forward fuselage 2×7.7 mm. fixed forward wings.
Mitsubishi 00 ...	Single-seat low-wing monoplane. All-metal stressed-skin construction. Fitted flaps; transparent perspex-covered cockpit; single fin and rudder. Hydraulically controlled retractable undercarriage.	39.4ft. 28.4ft. 256 sq. ft.	One Nakajima N.K.I. 14-cyl. air-cooled radial of 900 h.p. at 15,000ft.	Maximum speed with a normal flying weight of 5,140 lb. is 315 miles per hour at 10,000ft. Service ceiling 36,000ft. Range 590 miles at 265 m.p.h., but can be increased to 1,600 miles at 160 m.p.h. by fitting with external fuel tanks.	2×7.7 mm. cannons firing through the airscrew disc. 2×20 mm. in the wings.

These tables are based upon information obtained from the British Air Ministry.

JAPAN'S AIR POWER

TORPEDO AIRCRAFT

Type	General Description	Dimensions: Span, Length, Wing Area	Power Plant	Performance	Armament
Nakajima T96 ...	Single-engine, biplane with fixed divided-type undercarriage, spatted wheels. Staggered wings of equal span folding. Tail plane braced, with rounded rudder. Fuselage of rectangular section, apparently fabric-covered. Crew three.	49 ft. 33 ft. 540 sq. ft. (?)	One Kotobuki air-cooled radial of 600 h.p. at 8,000ft. 2-blade wooden f.p. airscrew.	Normal weight 7,300 lb. Maximum speed 168 m.p.h. at 8,000ft. Service ceiling 20,000ft. Cruising speed 145 m.p.h. with a range of 145 miles or 2.9 hours, carrying 1,760 lb. Torpedo and 100 gallons or a range of 900 miles with 900 lb. bombs and 180 gallons.	1×7.7 mm. free dorsal.
Kawanishi T97 ... (Kawa 94)	Single-engine, twin float biplane, Tail float. Fuselage probably of tubular metal construction. Crew 2.	45.5ft. 38ft. 680 sq. ft.	One Kawanishi 12-cyl. liquid-cooled of 650 h.p. at 7,000ft.	Normal weight 8,000 lb. Maximum speed 155 m.p.h. at 7,000ft. Service ceiling 19,000ft. Crusing speed 135 m.p.h. with a range of 450 miles, or 3.3 hours, carrying 1,760 lb. torpedo and 120 gallons.	1×7.7 mm. fixed forward fuselage. 1×7.7 mm. free dorsal.
Mitsubishi T97/1	A similar aircraft was built by Nakajima as the T97/2 torpedo bomber with Hikari "3" 700 h.p. engine. Single-engine, low-wing monoplane with a retractable undercarriage. Wing has a pronounced taper and long wing-root fillets, tail plane tapered, fin with rounded tip and rudder has rounded trailing edge. Long covered cockpit, with hinged cover for dorsal gun. Fixed tail wheel.	50.8ft. 33.9ft. 375 sq. ft.(?)	One Kinsei air-cooled radial of 900 h.p. at 10,000ft. 3-blade Hamilton type metal airscrew.	Normal weight 8,500 lb. Maximum speed 195 m.p.h. at 10,000ft. Service ceiling 23,000ft. Cruising speed 167 m.p.h. with a range of 470 miles, or 2.8 hours, carrying either 750 lb. bombs or a 1,760 lb. torpedo and 145 gallons.	1×7.7 mm. fixed forward fuselage. 1 or 2×7.7 mm. free dorsal.

DIVE-BOMBER

Mitsubishi T96 ...	Single-engine biplane with fixed split undercarriage and spatted wheels. Two bay folding wings of parallel chord. Ailerons on upper and lower wings. Centre section strongly braced to fuselage single fin and rudder with wire bracing. Open cockpits with small perspex superstructure between pilot and gunner. Wings and fuselage fabric-covered.	37.5ft. (?) 30.8ft. 420 sq. ft. (?)	One Kinsei 9-cyl. air-cooled radial of 730 h.p. at 7,000ft. (?) Fixed pitch airscrew.	Normal weight 5,200 lb. (?) Maximum speed 200 m.p.h. at 10,000ft. Service ceiling 23,000ft. Cruising speed probably about 155 m.p.h. range not known.	2×7.7 mm. fixed forward fuselage. 1×7.7 mm. free dorsal.

SEAPLANE FIGHTER

Nakajima T97 ... (Naka 93)	Single-engine, mid-wing twin float monoplane. Wing with slight taper and dihedral, rounded fin. Floats braced to wings. Probably of metal construction. Crew 2.	36.8ft. 33.5ft. 185 sq. ft.	One Nakajima air-cooled radial of 750 h.p. at 13,000ft., 3-blade metal airscrew.	Normal weight 5,300 lb. Maximum speed 220 m.p.h. at 13,000ft. Service ceiling 27,000ft. Cruising speed 190 m.p.h. with a range of 325 miles or 1.71 hours on 85 gallons.	2×7.7 mm. free forward fuselage. 2×7.7 mm. free dorsal.

SEAPLANE RECONNAISSANCE

Kawanishi T94 ...	Single-engine, twin-float biplane. Wings of equal span, monoplane tail, rudder with straight trailing edge. Fuselage of roughly rectangular cross-section. Probably of mixed construction. Crew 3.	46ft. 34ft. 530 sq. ft. (?)	One Hiro "91" 12-cyl. "W" liquid-cooled of 600 h.p. at S.L. 2 or 4 blade wooden f.p. airscrew.	Normal weight 6,100 lb. Service ceiling 18,000ft. Maximum speed 140 m.p.h. at 5,000ft. Cruising speed 120 m.p.h. with a range of 550 miles, or 4.6 hours, on 120 gallons, or with 500 lb. bombs, a range of 530 miles.	1×7.7 mm. fixed forward fuselage. 1×7.7 mm. free dorsal.
Nakajima T95 ...	Single-engine, central float biplane. Swept-back wings of approximately equal span, with interplane and centre section bracing by "N" struts, single fin and rudder. Large central float carried on four struts, wing floats outboard of interplane struts. Open cockpits. Wings and fuselage apparently fabric-covered. Crew 2.	36.1ft. 27.9ft. 330 sq. ft. (?)	One Kotobuki 9-cyl. air-cooled radial of 600 h.p. at 11,000ft. 2-blade metal f.p. airscrew.	Normal weight 5,800 lb. Service ceiling 18,000ft. Maximum speed 160 m.p.h. at 11,000ft. Cruising speed 135 m.p.h. with a range of 500 miles, or 3.7 hours, carrying 220 lb. bombs and 120 gallons, or with 500 lb. bombs and 85 gallons a range of 320 miles.	1×7.7 mm. fixed forward fuselage. 1×7.7 mm. free dorsal.
Aichi T97 ... (Aichi 92)	Single-engine, twin float biplane. Fuselage probably of tubular metal construction.	42.6ft. 32.5ft. 430 sq. ft.	One Aichi of 770 h.p. at 13,000ft.(?) Fixed pitch airscrew.	Normal weight 5,630 lb. Maximum speed 180 m.p.h. at 13,000ft. Cruising speed 155 m.p.h. with a range of 410 miles, or 2.65 hours on 120 gallons.	1×7.7 mm. fixed forward fuselage. 1×7.7 mm. free dorsal.

BOMBERS

Mitsubishi T96 ... (Mark IV)	Twin-engine, mid-wing monoplane; retractable undercarriage. Tapered wings with Junkers-type flaps and ailerons extending whole length of trailing edge. Twin rudder tail, fins halfway between fuselage and tips of tail-plane. Cockpit forward of leading edge metal-panelled nose, fuselage tail-cone extends beyond tail-plane. Two dorsal gun positions with perspex covers. Some versions have large perspex dome amidships and two side blisters. Crew 4 to 7.	82ft. 54ft. 800 sq. ft.	2 Mitsubishi, or Kinsei IV, 14-cyl. air-cooled radials of 1,000 h.p. at 10,000ft. 3-blade V.P. metal airscrew.	Normal weight 22,000 lb. Maximum speed 230 m.p.h. at 10,000ft. Service ceiling 24,000ft. Cruising speed 200 m.p.h. with a range of 950 miles or 4.75 hours, carrying 2,200 lb. bomb and 400 gallons.	2×7.7 mm. fixed forward wings. 1×7.7 and/or 20 mm. free dorsal turret, 2×7.7 mm. free lateral. 1×7.7 mm. free ventral, 1×7.7 mm. fixed tail.
Mitsubishi 96 ... ("Otori")	Twin-engine low-wing monoplane, retractable undercarriage. Tapered wings with Junkers type flap and ailerons. Angular tail with twin fins set in from tailplane tips. Long-covered cockpit raised above fuselage decking.	55ft. (?)	2 Nakajima "Kotobuki III" air-cooled radials of 550 h.p., 2-blade V.P. airscrews.	Maximum speed 240 m.p.h. Range 1,800 miles (?)	Armament unknown.

FLYING BOATS

Mitsubishi T96 ...	Believed to be a scaled up version of the Short "Calcutta" flying boat. Three engine, biplane. Braced wings of unequal span, single-fin braced tail unit. Wing floats. Single-hull of metal construction. Crew 6.	96.7ft. 70 ft. 2,500 sq. ft.	Three Mitsubishi 12 cyl. "V" liquid-cooled 900 h.p. The nacelles are mounted between the wings. 2-blade airscrews.	Normal weight 38,750 lb. Maximum speed 145 m.p.h. at 10,000ft. Service ceiling 13,000ft. Cruising speed 125 m.p.h. with a range of 1,400 miles or 11.25 hours, carrying 2 000 lb. bomb and 1,450 gallons.	Believed to include 1×37 mm. and 4×7.7 mm. guns.
Hiro 97	Four-engine, parasol flying-boat. Braced wing carries outboard floats. Conventional two-step pull. Single fin cantilever tail unit of angular outline. Design based on French LEO H-24-6.	104ft. 69.5ft.	4 Hispano-Suiza liquid-cooled motors of 720 h.p.(?), 3-blade metal airscrews.	Normal weight 32,900 lb. (?) Maximum speed 208 m.p.h.	Gun positions in nose and dorsal.

JAPAN'S AIR POWER

FLYING BOATS (*Continued*)

Type	General Description	Dimensions: Span, Length, Wing Area	Power Plant	Performance	Armament
Kawanishi T97 ...	Four-engine, parasol monoplane reported to be based on the S42 Sikorsky flying boat, and developed from Kawasaki flying boat operating the Yokohama-Saipan-Pelew Service. Braced wing and tail unit, twin rudders. Wing floats. Single hull. Crew 10.	131ft. 81ft.	Four Kinsei 4C 14 cyl. air-cooled radial: of 900 h.p. at 13,000 ft. The nacelles are mounted in the leading edge of the wing. 3-blade metal airscrew.	Normal weight 45,000 lb. Maximum speed 215 m.p.h. at 13,000ft. Service ceiling 26,000ft. Cruising speed 165 m.p.h. with a range of 1,500 miles or 9 hours on 1,500 gallons, or with 3 500 lb. bombs a range of 1,450 miles.	Turret forward fuselage. Turret dorsal.
Aichi T98 ... (Aichi 184)	Single engine, biplane.	49.2ft. 36.1ft. 160 sq. ft.	One type "9" of about 500 h.p. at S.L. Airscrews not known.	Not known, probably about 121 m.p.h. maximum speed at S.L. and about 80 m.p.h. cruising with a range of 1,100 miles or 14 hours.	1×7.7 mm. free forward fuselage only installation known
Aichi T98 ... (A'chi 184)	Three-engine, mid-wing twin float monoplane. Wings tapered to rounded, the tips slight dihedral, single-fin tailplane with rounded rudder and fin. Streamline all-metal fuselage with long cockpit cover Crew 5.	87ft. 63ft. 940 sq. ft.	Three Aichi air-cooled radials of 770 h.p. at 13,000ft. 3-blade metal airscrews.	Normal weight 26,400 lb. Maximum speed 230 m.p.h. at 13,000ft. Service ceiling 24,000ft. Cruising speed 190 m.p.h. with a range of 1,000 miles, or 5 hours, with 2,200 lb. bombs and 590 gallons.	Reported armament includes 2×37 mm. but 20 mm. calibre more likely. 1× "cannon" forward fuselage. 4×7.7 mm. fixed forward wings. 1×"cannon" free dorsal.

commercial aircraft purchased by Japan has been adopted for military purposes, and that the Focke-Wulf Fw.200 "Condor" mentioned before has served as the basis for the development of a military version.

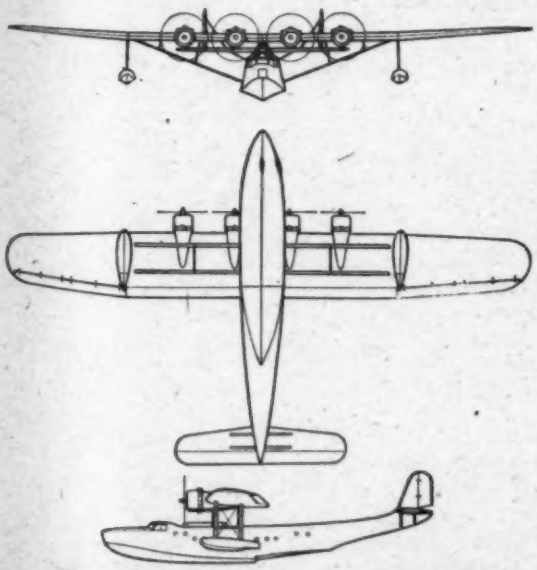
While political affiliations did not prevent Japan benefiting from technical developments in the U.S.A., it is almost certain that she has taken good advantage of technical improvements in Italy and Germany. During the "lull period," and as long as relations between Russia and Germany were peaceful, she had a direct and undisturbed contact with her Axis partner. But this collaboration was not limited to this period, and continued as long as Japan's flag was neutral.

By an Imperial Decree of July 26th, 1936, the Japanese Air Forces have been reorganised and a new framework for their activities has been established. While military aviation in Japan, Korea and Formosa came under the command of an army general and a separate Army Air Force was thus created, naval aviation was formed into a separate branch under the orders of the Admiralty. Ever since, the problem of an independent Air Force has occupied an important place in the deliberations of Japan's military leaders. Whereas in other countries, however, the approach to this problem was purely objective, in Japan it reflected the strong traditional background of her military forces.

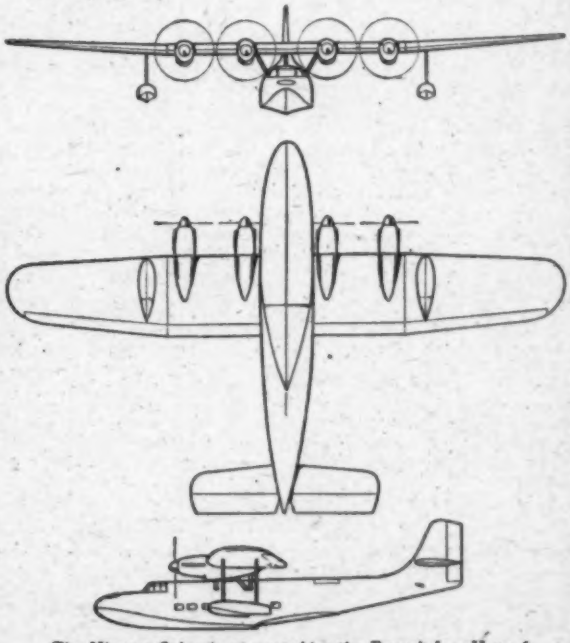
For whereas the Army and the Navy are rooted in the Samurai and Bushido traditions and their leadership has been for generations linked with some families, the Air Arm was free from such cast ties. The whole existence and efficiency of the Air Arm depended largely on the selection of men, for their individual mental independence and mechanical aptitude—a new and dynamic factor in Japan's military

Nakajima T95 (Reconnaissance)

Mitsubishi T96/2a (Navy fighter)



Kawanishi T97 flying boat based on a Sikorsky design.



The Hiro 97 flying boat resembles the French Leo H-24-6.

JAPAN'S AIR POWER

structure. To counterbalance them, the Air Forces were linked up with the Army and the Navy, with an increased emphasis on the latter.

The Army Air Force has its own air staff directly responsible to the Supreme Lord—the Emperor—and is directed by the Military Aviation Directorate of the War Office. The latter is divided into (a) General Affairs, (b) Research and Investigations, (c) Aircraft Inspection, and (d) Supply. The Supply Branch, centred in Tokyo has regional H.Q.s in Formosa, Korea and in other parts of the Japanese Empire. Aeronautical research is centred at the Imperial University of Tokyo, supported by the Army Aircraft Establishment at Tokorazawa, the Naval Air Service Experimental Station in Tokyo and one or two laboratories belonging to industrial firms.

Training and Organisation

The training of the airmen has acquired a particularly bad reputation, due to the high rate of accidents. In 1935 about ten per cent. of the total aircraft strength had to be written off on account of crashes in training, the proportion for 1936 showing only a slight improvement. But although these figures may show what difficulties were involved in the expansion of Japan's Air Arm, they are not true to-day. Both in the skill of instructors and methods of training the Japanese are not inferior to other nations. To-day Japan has an efficient Air Force College at Kumagii, combat schools at Akenohara and Hamamatsu, an A.A. Training centre at Inagemachi and a superior Air College at Shimoshizu. Training centres for parachutists have been established at Nagasaki, Kobe, Seul Tsuruga.

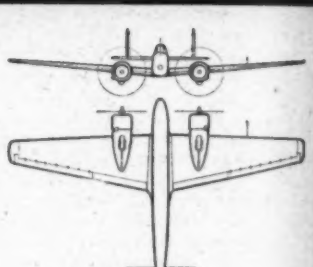
The organisation of the Army Air Force was originally based on French lines. The tactical unit is the squadron comprising ten to 14 machines; two to four squadrons form a regiment; three to six regiments form a brigade. Pilots are appointed from both commissioned and N.C.O. ranks, the former being in predominance.

Nakajima T95 reconnaissance seaplane.

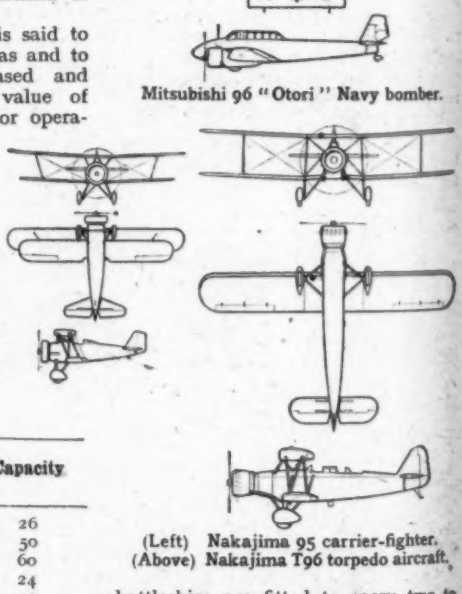
In connection with the operations against China, more importance was attached in the late 'thirties to the development of the Naval Air Service. Although this tendency has been since balanced by the need for Army Air Forces in the land fighting in China, it can be assumed that the former is the more efficient branch of Japan's Air Arm. The fact that the Mitsubishi group has substantial naval interests, being the largest shipyard owners in Japan, has also helped the command of the Naval Air Arm to claim priority on types developed by the Mitsubishi aircraft plants. The consistent policy of the Japanese to prepare for the present war has been undoubtedly responsible for the further improving of the Naval Air Arm which is the spearhead of Japanese aggression.

The Naval Battle Force is said to be divided into three Flotillas and to comprise separate shore-based and carrier-based units. The value of the Naval Air Arm in major operations in the Pacific has been early recognised by the Japanese, and no efforts were spared to develop its striking power.

Below is the list of aircraft and seaplane carriers in service with the Japanese Naval Air Arm. This strength is augmented by aircraft carried on other men-of-war. Perhaps 14 battleships are fitted to carry two to four aircraft each, while one or more seaplanes may be found aboard the 43 cruisers for scouting.



Mitsubishi 96 "Otori" Navy bomber.



(Left) Nakajima 95 carrier-fighter.
(Above) Nakajima T96 torpedo aircraft.

Such appears to be the structure of Japan's Air Arm. Hitherto her Air Forces have not met a strong opposition. But, once this happens, and their ranks begin to be depleted, Japan will have to meet a new situation.

AIRCRAFT CARRIERS

Class	No. in Service	Tonnage	Year of Launching	Speed (in knots)	Capacity
Nosyo	1	7,500	1921	25	26
Akagi	1	26,900	1922–5	25	50
Kaga	1	26,900	1928	23	60
Rujo	1	7,100	1933	25	24
Soryu	2	10,050	1935	30	40
Koryu	3	12,000	1939	30	50

SEAPLANE CARRIERS

Notoro	1	14,050	1920	12	16
Kamoi	1	17,500	1922	14	16
Titose	2	9,000	1937	18	20
Taigei	1	10,000	1933	20	(?)
Mizuo	2	9,000	1938	17	20 and 4 catapults

Correspondence

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

TOPICAL AIRCRAFT PROBLEMS

Pressure Cabins for Civil Types

BEING a constant reader, I am very grateful to *Flight* and its Editor for publishing my correspondence, thus giving me the opportunity to take part in discussing the present-day technical problems of aviation. The question I want to raise here is the description of a pressure cabin installation in Prof. Bock's article in your issue of April 2nd, from which it is evident that the passengers or crew are breathing in pure oxygen till a certain critical height is attained, when the compressed air is admitted in order to keep them alive.

This process is unlikely to be applied in civil aviation, as we have to face the necessity of denitrogenisation of the passengers before placing them in a stratoplane (considerable loss of time and great discomfort) and the tiring conditions of a long flight.

The ideal pressure cabin is that in which the normal sea-level conditions could be maintained irrespective of altitude. In this case, neither supply of pure oxygen nor low-pressure valve is necessary, and there is no anxiety of forcing-in the walls of the cabin, but they must be stressed against the possibility of disruption owing to the higher pressure in the interior of the cabin in relation to the external one at high altitude.

I think that Prof. Bock is treating this subject from a military viewpoint only. One also wonders why there is no exhaust arrangement in his cabin for removing the exhaust products of the human body.

W. JAWORSKI.

HOME GUARD AIR ARM

Plenty of Enthusiasm

I HAVE read with interest the article in *Flight* of April 16th headed "Home Guard Air Arm," signed "1926 A Licence."

The idea, I think, is good; my suggestion would be to find out the number of machines available, and for replacement. Then obtain the permission of the Air Council and Home Guard Authorities.

The efficient maintenance would, of course, depend to a great extent on financial support; but if this scheme depends on the enthusiastic co-operation of "old pilots" like myself, then I feel sure that it will eventually materialise.

I have served in the R.A.F. in the last war, also this one, and A.T.A. My A licence expired in 1940.

"ONLOOKER."

Keeping Communications Alive

I AM very glad to see the suggestion for an H.G.A.C. and your valuable interest in the idea. It is certain that plenty of men above military age will accept the chance of putting their flying experience to good account. The inspiration of "1926 A Licence" has given me the hope that my training can be put to useful service.

Whenever Press photographs or films show officers "going places" in the course of their duties in actual operations they frequently travel by air.

To get about when a "do" is on and keep communications alive when the area for miles around is full of transport and troops on the move I can think of no better means than a light aircraft able to get down in a small field which ordinary Service aircraft could only do with risk of disaster. I sincerely hope the suggestion of "1926 A Licence" meets with success.

C. A. H.

Holiday Refresher Training

I AM sure the suggestion of a Home Guard Air Corps will appeal very strongly to those pilots with "A" licences, whose work has so far prevented them from using their enthusiasm for and training in flying.

The problem of finding time for intensive refresher and training courses is very real, but if the authorities thought well of the scheme, and took immediate action, I am sure many people would be glad to use such summer holidays as their work allows in attending training camps. In regard to the conditioning and servicing of the H.G. aircraft, could not such a comparatively small number of aircraft be initially rendered serviceable at E.F.T. schools, and thenceforward, after a suitable training and lecture period, be maintained by the H.G. pilots, perhaps for a time being taken to the nearest suitable airdrome for a periodic inspection by qualified ground crews, until the H.G. personnel were regarded as competent?

By the very nature of their reserved position it is very probable that most prospective H.G. pilots would be men with considerable knowledge and aptitude in mechanical affairs and would be able to pick up the necessary maintenance knowledge and skill reasonably rapidly. Certainly there would be all the enthusiasm in the world in their application to their task.

G. S. FREEMAN
("A" Licence 8297).

Impetus to A.T.C. and H.G.

BY advocating the formation of an Air Arm to operate in conjunction with the Home Guard, your correspondent reminds us of one of those things which, so far, we have left undone.

There are, as your correspondent estimates, at least 100 light aircraft in storage throughout the country, most of which could be put in flying condition. Maintenance and operation would, of course, come within the administration of the Air Training Corps.

Were a corps of this kind to be formed the impetus it would give to the A.T.C. and Home Guard efficiency scarcely requires comment. In addition, those "A" licence pilots who are ineligible for the Services would have the opportunity of doing a useful flying job, if only in their spare time.

Between May and October we have favourable flying weather, so the scheme is worth immediate consideration. Even if each A.T.C. squadron, together with the local Home Guard unit, were to have a single aircraft in operation, the resulting assistance to training would be considerable, particularly in regard to manœuvres and "recco."

We presume that the initiative would have to come from the Air Training Corps, as they are in the best position to ascertain the number and location of available aircraft.

Were the new corps to be formed there would be no lack of interest on the part of the remaining "A" licence pilots, who, as yet, have been unable to make use of their air trainnig.

It is as well to remember that, apart from a "refresher" to equip them for the relatively elementary flying duties involved, the scheme would not incur prolonged flying instruction.

H. W. G.

Would Suitable Fields be Available?

WITH reference to the letter by "1926 A Licence" in *Flight* of April 16th on "Home Guard Air Arm," the leading article in this journal criticises "1926 A Licence's" suggestion, and there is one phrase which I do not agree with. That is: "A small and slow aircraft flying low looks pretty much like a larger and faster one flying higher." Evidently this statement refers to the problem of identification being made more difficult. A typical example of a small and slow aircraft flying low is a Miles Magister, is it not? Now the majority of the wing span of all single-engined jobs range from about 30ft. to, shall we say, 50ft., and these are the jobs which the Home Guard propose to fly. So we can say now that all aircraft with single engines and with the aforementioned span could not look like a larger and faster one flying higher, for the simple reason the larger one which would be flying higher would undoubtedly have to be a twin-engined job to have a wing span in excess of 30ft. to 50ft. except in very rare cases. Therefore, I do not think that the work of the R.O.C.C. would be made more difficult.

Coming back now to "1926 A Licence's" letter. In the first place I disagree with his statement that Home Guard aircraft would be able to operate from small fields.

(1) The majority of fields throughout the country are far too small and have too rough a surface for an aircraft to take-off unless, of course, the aircraft has a short take-off run and a steep angle of climb to clear the obstacles which would

CORRESPONDENCE

undoubtedly be very close to these so-called fields; an example of this type would be the "Taylorcraft."

(2) Fields which are suitable for operating an aircraft must be of a hard and dry nature so that they do not get water-logged after a good shower of rain. Therefore, I am afraid that they will have to be picked very carefully indeed if disaster is to be avoided.

"1926 A Licence" also states that in the event of an invasion, whereby R.A.F. airdromes would almost certainly be attacked, the Air Home Guard would still be able to operate from their small inconspicuous landing fields. Does not "1926 A Licence" realise that, although R.A.F. airdromes would be attacked by the invasion's fighter escort, the actual invaders would land on such fields that he suggests are suitable for the Home Guard's aircraft? Parachutists, gliders and even crash-landing troop-carrying aircraft would try to settle on these fields of his.

With reference to his remarks on the function of the Air Home Guard (that of dropping ammunition and maintaining communications to various army units), what does he think the Westland Lysander Army Co-operation machine is for?

As far as maintaining communications, I think the Royal Air Force is doing that job quite comfortably, and would continue to do so even in the event of an invasion. Summing up the whole idea, I think it is all right theoretically, but could anyone put it into practice? I think not.

JOHN DARLINGTON.

WHAT OF THE MAYO?

Its Value for Long-range Bombing

WHAT has become of the Mayo Composite Aircraft? One would have expected the upper component of this type of aircraft to be used frequently on long-range bombing flights, in which the problem is how to get a heavy load into the air and send it long distances without large weight-increasing petrol tanks. The objection may be in the time taken to lift, say, twelve bombers into the air; but the take-off time of the *Maia* was, I believe, only 12 seconds, so that there need not be more than 20 minutes between each launching, each three planes flying off to the objective, the others following in flights of three.

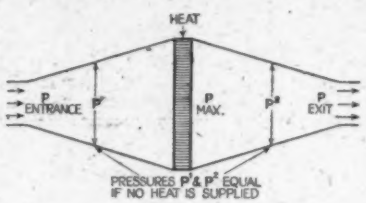
With these upper components fitted with retractable undercarriages and equipped as bombers, their wing-loading could be higher than the *Mercury's*, and raids over distant enemy territory more frequent. I end with a quotation of the closing paragraph from a recently published article on the Mayo Composite Aircraft: ". . . Finally, if the upper component were made a land machine with a retractable undercarriage instead of a float plane, better ranges for a given supply of petrol would be possible. Worked out to approximate proportions, the *Mercury* is able to carry a payload of 1,000 lb. across the Atlantic on one-half as much petrol as is required by the long-range version of the Empire flying-boats when carrying no payload at all."

G. C.

RADIATOR DRAG

Simplest Form of Heat Engine

THE self-propelling radiator mentioned by Dr. Ing. Günther Bock is easy to understand if it is regarded thermodynamically as a heat engine. It is exactly analogous to any I.C. engine; the working substance is compressed (by retardation, as in the downstream portion of a Venturi tube), heated, and allowed to expand again. (Both compression and expansion are nearly adiabatic, as in the I.C. engine.)



As a result heat is transformed into work; but since the compression ratio is low (1.106 max. at 400 m.p.h.) and the ratio of the temperature of the air leaving the radiator proper to that of the exit air from the rear slot must also be low (1.080 min. at 400 m.p.h.) the thermal efficiency is low. But in the heat handled is a high proportion of the total energy input and the amount of this heat recovered as mechanical energy is appreciable. Moreover, as this energy can be spread over a lot of air the thrust can also be quite appreciable.

The exact way in which the thrust is developed can be seen if a radiator is considered in which the expanding and contracting ducts are similar. As long as no heat is supplied, the pressure at any section in the expanding portion is equal (if frictional losses are ignored) to the pressure at the corresponding section in the contracting portion and the net thrust or drag is zero. But if heat is supplied, the temperature and velocity are higher, and in consequence the pressure is lower at any section in the contracting portion than at the corresponding section in the expanding portion; the total pressure in the downstream half is less than that on the upstream half, and the radiator as a whole experiences a thrust in the upstream direction, which may be greater or less than the frictional drag.

This device is of considerable interest as being the simplest type of heat engine, which has not even any moving parts.

Darwen. P. A. S.

BOOK REVIEWS

Glasgow's Fighter Squadron. By F. G. Nancarrow. Collins, 2s. 6d. net.

SOME years have passed since *Flight* first paid an official visit to No. 602 (City of Glasgow) Squadron, then commanded by Sqn. Ldr. the Marquess of Clydesdale (now the Duke of Hamilton) and equipped with Wapitis—for it was then a bomber squadron. We have followed its fortunes ever since with a live interest, and we shared in the general jubilation when, on October 16th, 1939, it and No. 603 (City of Edinburgh) Squadron were the first two units of the Auxiliary Air Force to go into action in their Spitfires against an enemy and "lose their amateur status."

Since repelling that first raid on warships in the Firth of Forth, No. 602 has had many adventures and has won much glory. This little book tells much of the story, though some will have to be added after the war. For the time being this book is satisfying. The Foreword is written by Sir Patrick Dollan, once Lord Provost of Glasgow, and the proceeds of the sale of the book will go to the squadron's Benevolent Fund.

Guerrilla Warfare. By "Yank" (Bert) Levy. Penguin Books.

THIS little book is written for the Home Guard, and the author is engaged in lecturing to that body. It makes most interesting reading, for the author has had much practical experience of what he preaches. It is not much concerned with aircraft, though it points out that air reconnaissance has complicated the work of guerrilla fighters. If an enemy aircraft makes a forced landing where Home Guardsmen can get at it, the author advises that if there is time the instrument board should be blown up. If time is short, he says that the best thing to do is to wreck the tailplane; though it is also useful to put some matter into the fuel tank which will choke the carburettor and go on choking it.

"Handbook of Technical Instruction for Wireless Telegraphists." By H. M. Dowsett and L. E. Q. Walker. Iliffe and Sons Ltd., 25s.

THIS is the seventh edition, extensively revised and enlarged, of a book which provides simple instruction for sea-going operators and others in the general principles and practice of marine wireless communication, illustrated by diagrams, sketches and photographs of apparatus developed by British wireless companies. The first edition of this book was published in 1913, and those which followed have covered a period of great expansion in wireless technique—an expansion which still continues—and the new volume, which records the many changes and improvements incorporated in current apparatus, contains the latest available information on plant now in service. Published from the offices of *The Wireless World*, Dorset House, Stamford Street, London, S.E.1, this work of more than 660 pages is a complete text-book for the wireless telegraphist, providing a thorough course for the P.M.G. certificate.

Service Aviation

Royal Air Force and Fleet Air Arm News and Announcements

Promotions

Extracts from The London Gazette, April 14, 1942

Temp. Air Chief Marshals to be Air Chief Marshals.

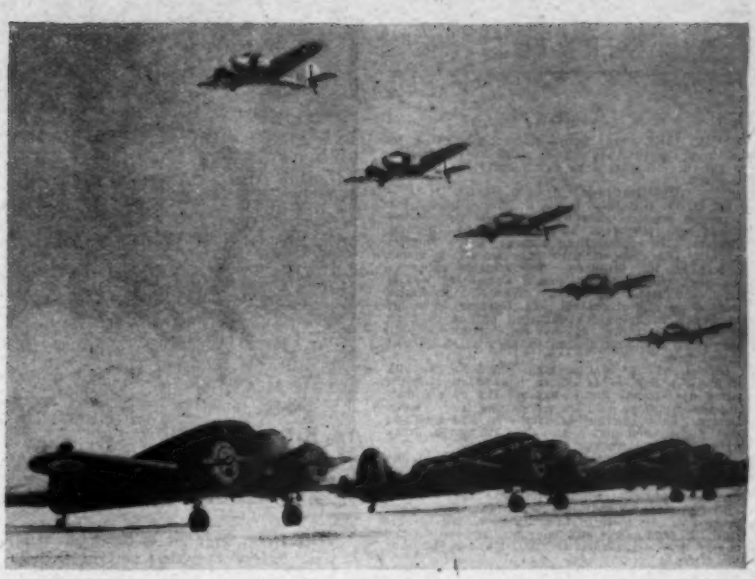
Air Vice-Marshal Sir Charles F. A. PORTAL, K.C.B., D.S.O., M.C. (Oct. 25th, 1940. Sen. May. 26th, 1940). Air Marshal Sir Wilfrid R. FREEMAN, K.C.B., D.S.O., M.C. (May 27th, 1940). Air Marshal Sir Philip B. JOUBERT DE LA FERTE, K.C.B., C.M.G., D.S.O. (July 1st, 1941).

Air Vice-Marshals (temp. Air Marshals) to be Air Marshals.

Sir Richard E. C. PEIRSE, K.C.B., D.S.O., A.F.C. (July 1st, 1940). Sir Sholto DOUGLAS, K.C.B., M.C., D.F.C. (Nov. 25th, 1940). Sir Arthur W. TEDDER, K.C.B (June 1st, 1941). Sir William L. WELSH, K.C.B., D.S.C., A.F.C. (July 1st, 1941).

Air Cmdres. (temp. Air Vice-Marshals) to be Air Vice-Marshals.

K. R. PARK, C.B., M.C., D.F.C. (July 1st, 1940). D. G. DONALD, C.B., D.F.C., A.F.C. (July 1st, 1940). N. H. BOTTOMLEY, C.B., C.I.E., D.S.O., A.F.C. (July 1st, 1940). R. M. DRUMMOND, C.B., D.S.O., O.B.E., M.C. (act. Air Marshal) (Jan. 10th, 1941). F. J. LINNELL, C.B., O.B.E. (act. Air Marshal) (Jan 10th, 1941). J. O. ANDREWES, D.S.O., M.C. (Jan. 10th, 1941). J. C. SLESSOR, C.B., D.S.O., M.C. (Jan. 10th, 1941). A. CONINGHAM, C.B., D.S.O., M.C., D.F.C., A.F.C. (June 1st, 1941). Grp. Capt. C. E. H. MEDHURST, C.B., O.B.E., M.C. (temp. Air Vice-Marshal) to be Air Vice-Marshal (June 1st, 1941).



ECHELON TO STARBOARD: Cessna Cranes at a Royal Canadian Air Force flying training school in Manitoba. They are the standard twin-engined trainers and are used for day and night and instrument flying.

Grp. Capts. (temp. Air Vice-Marshals) to be Air Cmdres.

J. M. ROBB, C.B., D.S.O., D.F.C., A.F.C. (Jan. 1st, 1940). J. J. BREEN, O.B.E. (Feb. 20, 1940). G. C. PIRIE, C.B.E., M.C., D.F.C. R. H. M. S. SAUNDBY, M.C., D.F.C., A.F.C. D. F. STEVENSON, C.B.E., D.S.O., M.C. Hon. R. A. COCHRANE, C.B.E., A.F.C. W. A. CORYTON, C.B., M.V.O. D.F.C. (July 1st, 1940).

Grp. Capts. (temp. Air Cmdres.) to be Air Cmdres.

D. COLYER, D.F.C. (act. Air Vice-Marshal) (Dec. 1st, 1940). J. W. CORDINGLEY, C.B.E. (Jan. 10th, 1941). H. W. L. SAUNDERS, C.B.E., M.C., D.F.C., M.M. (act. Air Vice-Marshal). L. N. HOLLINGHURST, C.B., O.B.E., D.F.C., (act. Air Vice-Marshal). R. P. M. WHITHAM, C.B., O.B.E., M.C. (Mar. 1st, 1941).

Wing Cdrs. (temp. or War Substve. Air Cmdres.) to be Grp. Capts.

H. B. RUSSELL, D.F.C., A.F.C. R. S. SORLEY, O.B.E., D.S.C., D.F.C., (act. Air Vice-Marshal). H. G. CROWE, M.C. H. P. LLOYD, C.B., C.B.E., M.C., D.F.C. (act. Air Vice-Marshal). O. A. STEVENS, M.C. G. E. GIBBS, M.C. R. HARRISON, D.F.C., A.F.C. A. L. FIDDAMENT, D.F.C. A. C. COLLIER, C.B.E. (act. Air Vice-Marshal). G. M. LAWSON, C.B.E., M.C. S. E. TOOMER, D.F.C. W. F. DICKSON, D.S.O., O.B.E., A.F.C. (Jan 1st, 1940). C. E. V PORTER. R. A. GEORGE, M.C., P. H. MACKWORTH, D.F.C. (Mar. 1st, 1940).

Wing Cdrs. (temp. or War Substve. Grp. Capts.) to be Grp. Capts.

H. M. MASSEY, D.S.O. M.C. H. G. W. LOCK, D.F.C., A.F.C. O. R. GATFORD, C.B.E., D.F.C A.F.C. K. B. LLOYD, A.F.C. E. R. OPENSHAW, A.F.C. H. V. ROWLEY. H. D. O'NEILL, A.F.C. A. O. LEWIS ROBERTS, D.F.C. A. R. CHURCHMAN, D.F.C. C. B. S. SPACKMAN, D.F.C. S. F VINCENT, D.F.C., A.F.C. G. S. ODDIE, D.F.C., A.F.C. A. P. LEDGER, M.B.E J WHITFORD, O.B.E. (Mar. 1st, 1940).

CHIEF OF COMBINED OPERATIONS: Lord Louis Mountbatten and his staff. (Left to right): Group Captain A. H. Willetts, D.S.O.; Rear Admiral H. E. Horan, D.S.C.; Major General J. C. Haydon, D.S.O., O.B.E., Chief of Combined Operations, Vice-Admiral Lord Louis Mountbatten, G.S.V.O., K.C.V.O., D.S.O.; Air Vice-Marshal J. M. Robb, C.B., D.S.O., D.F.C., A.F.C.; Brigadier G. E. Wildman-Lushington (Royal Marines) and Commodore R. M. Ellis, D.S.O.

SERVICE

Awards

THE KING has been graciously pleased to approve the following awards in recognition of gallantry displayed in flying operations against the enemy:—

DISTINGUISHED FLYING CROSS.

Lt. D. W. GOLDING, S.A.A.F., No. 4 (S.A.A.F.) Sqn.—On his first encounter with the enemy this officer was surprised and engaged by German fighters. He evaded their attacks, but a Messerschmitt 109 collided with his aircraft and cut 2 feet off the tailpiece. The control wires to the port aileron were jammed and there was a deep gash in his main plane. The Messerschmitt went down out of control. Lt. Golding, however, succeeded in flying his damaged fighter back to base 70 miles away. He has since destroyed four enemy aircraft and shared in the destruction of three more.

Lt. M. C. E. MACDONALD, S.A.A.F., No. 21 (S.A.A.F.) Sqn.—This officer has taken part in many operational flights against the enemy during the campaign in East Africa and the Western Desert. On numerous occasions he has acted as sub flight commander and has displayed great flying ability, courage and skill.

One day in November, 1941, Lt. Macdonald was attacked by a Messerschmitt 109F. His rear gunner was badly wounded and his aircraft was damaged, one engine being put out of action, the under-carriage wheels hit and the tail wheel destroyed. In spite of this, he succeeded, by his skill, determination and courage, in evading the enemy over a distance of 60 miles, and brought his aircraft back to base. Lt. Macdonald's cheerfulness has had a marked effect on the morale of the squadron, and he has proved himself to be a constant source of inspiration to all.

P/O. R. M. ACHILLES, R.A.A.F., No. 451 (R.A.A.F.) Sqn.—This officer has carried out many sorties in the Western Desert, including tactical and photographic reconnaissances and escorts to other pilots. These operations were carried out from a low altitude and in the face of intense and accurate anti-aircraft fire.

On one occasion, whilst carrying out a reconnaissance of Capuzzo from an altitude of 800 feet, P/O. Achilles's aircraft was damaged by the enemy's fire and his wireless aerial shot away. Nevertheless, he completed his reconnaissance. This officer is one of the soundest and most reliable reconnaissance pilots of the squadron, and his work has been praised by the Army formation with which he has co-operated.

Sgt. (now P/O.) F. M. BENITZ, R.C.A.F., No. 104 Sqn.—One night in October, 1941, Sgt. Benitz, as he then was, was the captain of an aircraft which took part in a raid on Naples. After a successful attack, the port engine in his aircraft began to fail. Sgt. Benitz thereupon set course for his base, but discovered that several of his bombs still remained hung up.

Although the defective engine was giving little power, causing the aircraft to lose height, Sgt. Benitz changed course for an alternative target, and finally released his remaining bombs over the heavily defended area of Palermo. By now the port engine had failed completely, and the aircraft was flying at some 4,500 feet. Nevertheless, Sgt. Benitz headed the aircraft towards the coast in order to avoid the mountains and, displaying fine airmanship, he finally succeeded in reaching his base and landing safely. Throughout, this airman showed great courage and determination.

P/O. I. G. BROOM, R.A.F.V.R., No. 107 Sqn.—This officer has completed 45 sorties. He has participated in attacks on a wide variety of targets with much success, obtaining hits on a factory at Catanzaro, on military barracks at Buerat, and on mechanical transport and barracks near Tripoli. In November, 1941, he bombed and machine-gunned a 4,000-ton ship, setting it on fire. This officer has at all times displayed great leadership, courage and determination.

P/O. G. S. BURGAN, R.A.A.F., No. 11 Sqn.—This officer has shown outstanding keenness and ability during the campaign in the Western Desert. On one occasion he was shot down and taken prisoner, but, displaying great daring and initiative, he succeeded in escaping and brought back much valuable information. Whether in the air or on the ground P/O. Burgan has displayed tireless and efficient organising capacity.

P/O. G. A. COOKE, No. 14 Sqn.—This wireless operator-air gunner has served with the squadron since March, 1938. He has completed 82 sorties. In July, 1940, he shot down an Italian Savoia 81, which was seen to crash into the sea. In September, 1940, P/O. Cooke was the rear gunner of a Wellesley aircraft, and, during a flight near Cassala, Sudan, he shot down two Italian fighters. He has at all times shown great courage, keenness and determination. As wireless and gunnery officer of the squadron he has rendered valuable service.

W/O. L. Cottingham, of No. 33 Squadron, who has been awarded the D.F.C. for his service in the Middle East. *The official citation appears on this page.*

AVIATION

P/O. L. C. WADE, R.A.F.V.R., No. 33 Sqn.—This officer has carried out 54 operations against the enemy, and has taken an active part in the squadron's very successful operations against enemy transport columns and airdrome. One day in November, 1941, he took off with five other pilots to defend a forward airfield which was being attacked by 12 Junkers 88's, and destroyed one of them. On the same afternoon he led a section of two aircraft detailed to intercept a Savoia 79 escorted by six fighters. P/O. Wade shared in the destruction of the enemy bomber after driving off the fighters. On another occasion, during an attack on Agedabia airfield in the face of intense enemy opposition, this officer damaged three Caproni 42's on the ground and destroyed a Savoia 79, thus bringing his total to four enemy aircraft destroyed. P/O. Wade was subsequently shot down himself, but rejoined the squadron after walking for 25 miles. He has displayed outstanding courage, and has done much to maintain the excellent morale of the squadron.

P/O. P. H. G. WINTLE, R.A.F.V.R., No. [illegible] Sqn.—This officer has displayed great courage and devotion to duty during long and difficult flights, mostly over the sea.

W/O. L. COTTINGHAM, No. 33 Sqn.—W/O. Cottingham has served with this unit since December, 1938, and has taken part in operations against the enemy in Greece and the Western Desert. Since the war began in the Middle East he has destroyed 14 enemy aircraft. He has always shown the greatest determination and devotion to duty.

Flt. Lt. D. F. W. DARLING, No. 151 Sqn.—Since November, 1940, this officer has carried out a large number of operational sorties at night. Throughout, he has shown a strong sense of duty. He has often voluntarily undertaken flights many miles out to sea in appalling weather in an endeavour to intercept enemy raiders. By his untiring efforts and continued encouragement he has contributed materially to the high standard of operational efficiency of his flight.

Flt. Lt. A. M. TAYLOR, R.A.F.V.R., No. 39 Sqn.—This officer has proved himself to be a capable and courageous flight commander. Late in January, 1942, the formation of which he was the leader attacked an Italian convoy which was protected by a battleship and a number of cruisers and destroyers. Flt. Lt. Taylor led his formation through a fierce barrage and himself scored a hit on one of the merchant ships. Subsequently, in March, he led an attack on another convoy when a cruiser, a merchant vessel and a destroyer were torpedoed by the formation. A Junkers 88 was also destroyed on this occasion.

Act. Flt. Lt. J. L. W. ELLACOMBE, No. 151 Sqn.—This officer is a keen and courageous fighter pilot. Although he was severely wounded in the Battle of Britain, Flt. Lt. Ellacombe immediately resumed operational flying upon recovery. He has carried out numerous sorties by night in all weather, and he has destroyed two and probably destroyed a further two enemy aircraft.

P/O. H. E. BODIEN, No. 151 Sqn.—This officer has carried out many night patrols. As a night fighter pilot he has shown great devotion to duty and a complete disregard of danger. On one occasion, despite having trouble with his own aircraft, P/O. Bodien kept up a series of attacks on an enemy aircraft for some 45 minutes, and

COMBINED OPERATIONS: An Air-Liaison officer giving details of the "general situation" to air crews who will be working in close support of the troops.

finally destroyed it. He has destroyed three hostile aircraft at night.

P/O. R. I. LAING, R.N.Z.A.F., No. 75 (N.Z.) Sqn.—This officer has flown for a large number of hours during arduous operations in the Western Desert. Throughout, he has displayed outstanding courage and ability, particularly in low level machine-gunning raids on enemy airfields and motor transport columns. Such an occasion occurred in December, 1941, when, in a raid on the airfield at Jedabya, 13 enemy aircraft were destroyed on the ground. In this operation, P/O. Laing pressed home his attack with determination.

DISTINGUISHED FLYING MEDAL.

Sgt. A. P. MOUNTAIN, No. 37 Sqn.—This airman has carried out 54 long-distance sorties. These raids include attacks on objectives in enemy occupied France, in Cyrenaica, Syria, Greece and the Dodecanese Islands; he has also participated in a raid on the Corinth Canal area. Throughout, he has displayed a high standard of skill and determination, and he is regarded as one of the best of captains.

Sgt. C. F. MULLER, R.A.F.V.R., No. 70 Sqn.—This airman has carried out 55 sorties against the enemy, of which 29 have been against targets in the Middle East. During a recent attack on Derna he came down below heavy cloud at 2,000 feet to attack his target. His aircraft was hit by anti-aircraft fire which blew a large hole in the underpart of the fuselage and damaged the controls. In spite of this, he made a further run over the target and brought his aircraft safely back to base, though the hydraulics were out of action. Sgt. Muller has always shown the greatest keenness to participate in operations against the enemy.

Sgt. L. A. OVENS, No. 30 Sqn.—This airman has completed over 100 sorties. These sorties include bombing raids, machine-gun attacks and night-fighting operations on Greece and Egypt. On one occasion his aircraft was badly damaged by the fire of three Italian fighters which had intercepted, but, by skilful manœuvring, he finally evaded the attackers and flew safely back to his base. Sgt. Ovens has played a prominent part in the development of night fighting in his command. He is an exceptionally keen and able pilot.

Sgt. T. OWEN, No. 8 Sqn.—As a wireless operator-air gunner, Sgt. Owen has carried out 60 operational sorties during the campaigns in Abyssinia and the Western Desert. His efficiency, courage and keenness for action against the enemy are outstanding.

Sgt. A. H. PEACH, R.A.F.V.R., No. 70 Sqn.—This airman has completed 54 sorties against the enemy, the majority of which have been carried out in the Middle East. Sgt. Peach's attacks have been carried out with the greatest determination, and he has displayed continuous keenness to participate in operations. He is a most reliable captain of aircraft.

Sgt. M. H. PETTERSON, S.A.A.F., No. 21 (S.A.A.F.) Sqn.—This airman has proved himself to be an outstanding air-gunner. His courage, determination and daring have been exemplary. He has flown as air-gunner to his flight commander, and, by his swift thought and action, he has often been responsible for extricating the flight from danger. On September 27th, 1941, during an engagement over Bardia, Sgt. Petterson shot down a Messerschmitt 109. On another occasion he assisted in the destruction of another enemy aircraft over Derna. Although a youth in years, Sgt. Petterson has proved to be a veteran in aerial combat. His skill and devotion to duty have been a source of inspiration.

Sgt. J. ROBINSON, No. 148 Sqn.—As rear gunner, this airman has completed 67 sorties. Sgt. Robinson made 24 sorties over Germany and enemy occupied territory. Since then he has participated in operations in Libya, Greece and Crete. Throughout, he has displayed great efficiency, combined with exceptional keenness for operational flying.

Sgt. G. R. ROGERS, R.A.F.V.R., No. 113 Sqn.—This airman has been employed on operational flying since September, 1940. His courage, determination and devotion to duty have been an inspiration to the rest of his squadron.

Sgt. W. G. ROSS, R.A.A.F., No. 38 Sqn.—This airman has participated in 44 operational sorties, and, by his accurate navigation and bomb-aiming, he has contributed materially to the successes achieved. He has displayed noteworthy devotion to duty, while the meticulous care with which he prepares for operations is a fine example to all.

Sgt. C. B. SHEVLIN, No. 11 Sqn.—During a year of operational flying, this airman has carried out sorties against the enemy in Libya, Greece, Syria, Iraq and Iran. His duties have been performed with great skill and keenness, and he has proved himself to be a valuable member of a valuable crew.

Sgt. R. H. SIMES, R.A.A.F., No. 3 (R.A.A.F.) Sqn.—This airman has shown the greatest keenness to engage the enemy. In December, 1941, during a combat over the El Adem area, he damaged three enemy aircraft before being shot down himself in enemy territory. Despite this, he made his way back during the night, although he had been involved in a tank battle on the way. In January, 1942, his squadron, patrolling over Jedabya, encountered a force of some 50 enemy fighters. In the engagement which followed Sgt. Simes shot down three of them, bringing his total victories to six. His high character and strong personality have had an inspiring effect.

Sgt. A. SUDDEN, No. 148 Sqn.—As a navigator-bomb aimer this airman has carried out 50 sorties against the enemy, 45 of which have been against targets in Libya and in the Mediterranean area. He has participated in 19 attacks on objectives in the Benghazi area, and has also taken part in raids on the Corinth Canal. Sgt. Sudden has shown great ability in his work, and never releases his bombs unless he has made a perfect run over the target. His enthusiasm, efficiency and keenness have set a fine example.

Sgt. O. W. THOMPSON, R.N.Z.A.F., No. 107 Sqn.—This airman has attacked a variety of targets, obtaining hits on warehouses at Catanzaro, destroying a number of lorries on the Benghazi-Tripoli road, and participating in a successful attack on a railway siding at Soveranto. He took part in the second attack on a 10,000-ton enemy merchant ship, which resulted in its complete abandonment. On another occasion he attacked a heavily laden 1,000-ton merchant vessel off Tripoli; the vessel subsequently sank. This airman has shown able leadership and great determination in pressing home his attacks.

Air Sgt. T. D. BREMNER, S.A.A.F., No. 12 (S.A.A.F.) Sqn.—This airman has displayed exceptional ability as wireless operator-air gunner. He has completed 51 sorties. He has displayed a fine spirit, and this, combined with his cheerful outlook, has helped to maintain the morale of his comrades.

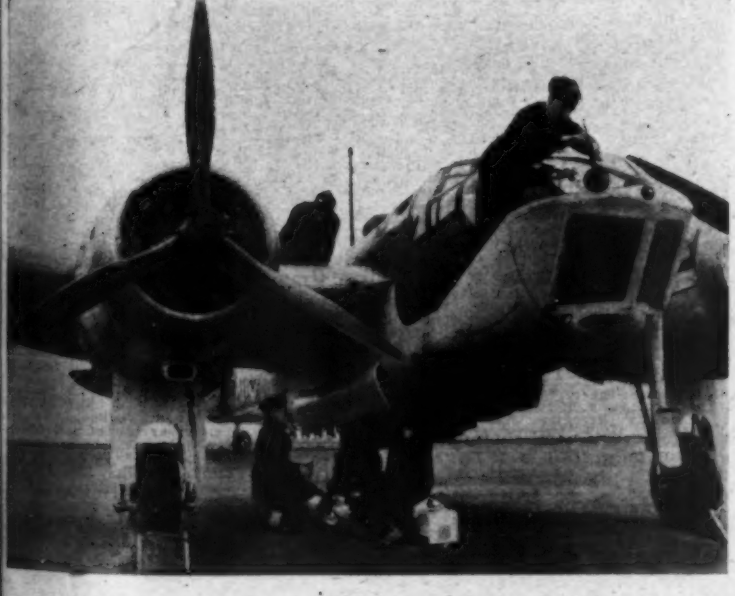
Air Sgt. W. L. DE VILLIER, S.A.A.F., No. 12 (S.A.A.F.) Sqn.—As an air gunner this airman has carried out 36 operational sorties against the enemy. He has always shown courage and keenness. His coolness and judgment have been outstanding.

Air Sgt. J. H. RAUTENBACH, S.A.A.F., No. 12 (S.A.A.F.) Sqn.—This airman is one of the original gunners of the squadron, and his advice and leadership have been of great value to the new gunners. He has carried out 56 raids over enemy territory, and has always displayed great coolness and good judgment.

Sgt. J. MOORE, No. 113 Sqn.—This airman has been employed on operational flying since September, 1940. On one occasion he took part in a low-level attack on Benghazi harbour in the face of heavy anti-aircraft and searchlight activity. The aircraft was hit and Sgt. Moore injured, but in spite of this he continued to use his guns against enemy searchlights and gun posts, whilst his pilot made two more runs through the harbour. This airman has displayed outstanding courage and devotion to duty.

Sgt. I. D. MACLEAN, No. 99 Sqn.—This airman is an extremely reliable pilot. On all his operational flights he has shown great persistence both to attack and, whenever possible, to obtain photographs of the target area. On one occasion, this led to his being caught in an extremely accurate barrage over Emden for some 20 minutes. He eventually evaded the barrage, only to return through it to secure another photograph. Sgt.

Teaching paratroops the art of touching down lightly. Polish paratroops jumping from a tower by the aid of a cable-controlled parachute.



A Bristol Blenheim being bombed up and re-armed for close support work. The "free" gun above the bomb aimer's panel is a Vickers K.

SERVICE AVIATION

Maclean has participated in numerous sorties, including attacks on Berlin, Kiel, Mannheim, Brest, Wilhelmshaven and other highly defended areas.

Sgt. W. A. MILLWARD, No. 408 (R.C.A.F.) Sqn.—One night in January, 1942, this airman was first wireless operator-air gunner of an aircraft detailed to carry out an attack on Bremen. Before reaching the target the aircraft was engaged and attacked by two Messerschmitt 110's, the aircraft being damaged and all the crew, with the exception of the pilot, being wounded. Although the intercommunication gear had been shot away and no instructions could be given, the pilot descended to a low level while Sgt. Millward continued to beat off the attackers. He eventually destroyed one of the enemy aircraft.

Sgt. F. H. G. JANES, No. 144 Sqn.—As wireless operator-air gunner, the airman has displayed a high standard of efficiency. He has participated in numerous operational flights, many of which have been carried out in severe weather, involving attacks on important enemy targets such as Wilhelmshaven, Hanover, Berlin, Brest and Bremen. He has always been ready to undertake the most difficult and dangerous tasks.

THE KING has been graciously pleased to approve the following award in recognition of brave conduct:—

MILITARY MEDAL.

A/C.1 G. A COTTRILL.—In February, 1942, this airman was a member of a machine-gun crew on board a transport which was subjected to a series of dive-bombing attacks covering a period of four hours. He used his gun with great skill, and his courageous and determined example inspired his fellow gunners, so that, after the first attack, the enemy aircraft kept at a respectful distance—a fact which undoubtedly assisted in the eventual safety of the ship. During the attack A/C. Cottrill shot down an enemy aircraft.

HIS MAJESTY THE KING has granted unrestricted permission for the wearing of the undermentioned decoration, conferred on the officers and airman indicated, in recognition of valuable services rendered in connection with the war:—

CZECHOSLOVAK MILITARY CROSS.

Conferred by the Provisional Czechoslovak Government.

Wing Cdr. F. H. TYSON.
Act. Sqn. Ldr. A. G. S. COUSENS, D.F.C.
Act. Sqn. Ldr. R. C. HOCKEY, R.A.F.V.R.
P/O. L. J. JUDSON, D.F.M.
P/O. R. P. WILKIN.
Sgt. A. HUGHES.

Roll of Honour

Casualty Communique No. 127.

THE Air Ministry regret to announce the following casualties on various dates. The next-of-kin have been informed. Casualties reported "in action" are due to flying operations against the enemy; "on active service" include ground casualties due to enemy action, non-operational flying casualties, fatal accidents and natural deaths.

Royal Air Force

KILLED IN ACTION.—Sgt. H. Banks; Sgt. L. S. Barker; Sgt. A. G. Bloomfield; Sgt. A. Bolton; Sgt. J. S. Brownsell; Sgt. J. Cartwright; Flt. Sgt. T. Dignan; Sgt. T. H. Errington; Flt. Lt. P. J. Fisher; P/O. J. MacGillivray; Sgt. J. J. McPherson; F/O. R. Maggs; Sgt. T. G. Middlebrook; Sgt. W. D. Morris; Sgt. D. S. Nicholas; Sgt. J. A. Rogers; Flt. Sgt. R. C. V. Rogers; Sgt. N. J. Rolfe; Sgt. W. A. Sanger; Sgt. A. E. Singerton; Sgt K. M. Tuck; P/O. R. B. Wark.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—F/O. P. S. B. Ensor, D.F.C.; Sgt. Griffin; L.A/C. R. C. Hoddell; Sgt. J. E. Jones; Sgt. R. J. L. Larwood; Sgt. S. J. L. Levack; Sgt. A. McKillop; Sgt. P. J. Magee; Sgt. C. T. H. Mappin; Flt. Sgt. G. D. Oliver; P/O. V. W. Olson; Sgt. L. D. Parry; Sgt. J. H. Reid; Flt. Sgt. P. A. Roberts, D.F.M.; A/C.2 J. A. Skinner; Sgt. W. R. Steele; Sgt. R. H. Tasker; Sgt. C. Taylor; Sgt. A. A. Thomson; Sgt. H. Wallace; Sgt. C. M. Williamson; Flt. Lt. E. W. Young.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. R. L. Burton; P/O. P. K. Clench; Sgt. H. O. Cook; Sgt. A. W. Cooper; P/O. J. W. Corfield; F/O. A. G. Crockett; Sgt. E. Cullen; Flt. Sgt. N. H. Davies; P/O. P. Delorme; Flt. Sgt. R. T. Fisher; P/O. G. C. M. Fletcher; Sgt. J. Fuller; P/O. B. B. Galt; Sgt. P. C. Gammon; P/O. J. C. Greenfield; Sgt. T. A. W. Hamilton; Sgt. G. T. Harper; Sgt. A. A. S. Heggie; P/O. F. J. Hogan, D.F.C.; P/O. P. J. Horniman; F/O. R. S. Jameson; Flt. Sgt. E. T. W. Jones; Sgt. W. Kay; Act. Sqn. Ldr. W. J. Lawson, D.F.C.; Flt. Sgt. W. H. McDougall; P/O. J. McGregor-Cheers; F/O. H. J. Madden, D.F.C.; P/O. V. M. Markham; Sgt. S. J. Millar; Act. Wing Cdr. J. L. Nicol, D.S.O.; Sgt. D. J. Nolan; F/O. C. D. Owen; Sgt. G. J. Parkin; Sgt. C. F. J. Parslow; Act. Flt. Lt. L. S. Pilkington, D.F.M.; P/O. R. P. Purvis; Sgt. G. K. Richards; Flt. Sgt. A. R. Robbins; Flt. Sgt. G. R. Slater; F/O. I. H. N. Terry; Sgt. H. Walton; Act. Wing Cdr. R. D. Welland; F/O. J. Welsh; Sgt. J. L. West; Sgt. W. J. P. Wheat; P/O. A. L. A. Williams; Sgt. R. Willis; Sgt. B. Winchester; Act. F/O. A. F. S. Winder.

WOUNDED OR INJURED IN ACTION.—Sgt. W. G. Eagle; Sgt. C. G. A. Ward.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—Sgt. R. Ball.

MISSING.—P/O. W. H. T. Andrews; P/O. P. V. Barthel; Sgt. A. T. Bennett; Sgt. H. W. T. Bidgood; Sgt. C. Broad; Sqn. Ldr. V. S. Butler, D.F.C.; Sgt. G. Cartwright; F/O. R. W. Cooper; Sgt. M. J. C. Cross; Flt. Sgt. K. Crouch; Sgt. G. W. Dalby; P/O. A. G. Davidson; P/O. R. M. Disley; Sgt J. Doughty; Sgt. J. A. Drever; Sgt. S. T. Drew; Sgt. M. S. Duder; P/O. J. B. Dunne; Sgt. W. M. A. Eardley; Act. Wing Cdr. A. Eyre, D.F.C.; A/C.2 T. W. Fenton; Sgt. L. N. Follows; Sgt. C. C. Ganly; Sgt. A. A. Gauld; P/O. P. C. Gill; P/O. T. G. H. Gulliver; Sgt. J. Healop; Sgt. C. E. Johnson; Sgt. R. J. G. Jones; Sgt. L. H. Kelley; Sgt. M. H. Knowles; Sgt. A. Levy; Sgt. D. McCallum; Sgt. J. T. H. Mowat; Sgt. R. M. Mules; Sgt. A. F. Murrell; Sgt. N. Nicholls; Flt. Lt. G. W. Nicholson; Flt. Sgt. J. D. O'Connor; Sgt. A. H. Phillott; P/O. A. J. Rampton; Sgt. R. C. Rawlins; L.A/C. N. B. Rendall; L.A/C. H. V. S. Richardson; F/O. W. J. Robertson; F/O. B. M. Sayers; Sgt. G. Shackleton; Sgt. E. R. Stirling; Sgt. D. F. H. Tuck; P/O. C. D. Waddingham; Sgt. G. E. Warren; Sgt. D. S. D. Welsh; Sgt. E. L. C. Wood.

KILLED ON ACTIVE SERVICE.—Sgt. A. Algar; Sgt. G. Brereton; Sgt. A. L. Clipson; Flt. Sgt. N. Collins-Campbell; Act. P/O. I. B. Conetant; Cpl. J. Craig; Sgt. T. A. B. Crowe; Sgt. T. F. Dale; Flt. Sgt. C. T. Deane; Sgt. T. M. Fitzjohn; Sgt. D. A. Flemming; Sgt. R. Fossey; F/O. H. D. Freakes; Sgt. J. V. Gardiner; Sgt. A. Garlick; L.A/C. R. I. Gilbert; Sgt. W. J. M. Howell; Sgt. S. E. Hyam; L.A/C. S. D. Jones; Act. Sgt. D. F. S. Kirby; Sgt. C. Lambert; Act. P/O. W. J. Lewis; P/O. D. E. Logan; Flt. Sgt. J. A. C. London; Sgt. H. Medley; Sgt. E. Millington; Sgt. W. W. Parr; A/C.1 K. R. P. Sheppard; P/O. R. C. Trench; Sgt. E. Watson; Sgt. J. K. Westwater; Flt. Sgt. F. H. Wilkinson.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Sgt. W. C. Dean; Sgt. S. C. Driver; L.A/C. A. E. Lee; Sgt. F. A. Tysall.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Sgt. N. F. C. Williams.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Act. Sgt. L. Alexander; L.A/C. F. Billingham; L.A/C. A. Bishop; L.A/C. G. Brindle; P/O. A. Hannay; Flt. Sgt. J. B. Harding; A/C.2 W. J. Henderson; Act. Sqn. Ldr. C. L. Hullock; L.A/C. J. Johnson; L.A/C. J. Kitson; Sgt. J. W. Mehuish; Sqn. Ldr. W. Pickersgill; Sgt. G. G. Rogers; Sgt. W. MacD. Young.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—L.A/C. J. Asquith; Sgt. C. A. Smith; L.A/C. R. A. Stevens.

PREVIOUSLY REPORTED WOUNDED OR INJURED ON ACTIVE SERVICE, NOW REPORTED DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—Sgt. J. H. A. Cox.

DIED ON ACTIVE SERVICE.—A/C.1 A. J. Bedham; A/C.2 A. H. Belcher; L.A/C. E. Begg; A/C.2 T. Hilton; W/O. L. Kenney; A/C.2 C. L. King; A/C.2 E. S. Ogbourne; L.A/C. F. T. T. Walters.

AMENDMENT TO CASUALTY COMMUNIQUE No. 118.—Sgt. D. A. G. Sullivan should have appeared under the heading "Killed on Active Service," and not "Died of Wounds or Injuries Received on Active Service."

Royal Australian Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. A. H. T. Cook; Sgt. J. W. C. Morris; Sgt. J. Roberts.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—P/O. R. M. Hodges.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—Sgt. N. G. Knight.

MISSING, BELIEVED KILLED IN ACTION.—Sgt. M. W. Hamilton.

MISSING.—P/O. D. H. Bain; Sgt. W. T. Jones; Sgt. J. B. Keeping; Sgt. K. J. Lauder; F/O. G. R. M. Ritchie; Sgt. D. R. Rutherford; Sgt. A. A. Thompson; Sgt. R. G. Tregenza.

KILLED ON ACTIVE SERVICE.—Sgt. J. E. Bourke; Sgt. S. W. Benson; F/O. P. R. Giddy; Sgt. I. McDonnell.

Royal Canadian Air Force

KILLED IN ACTION.—Sgt. G. W. D. Cricklow; Sgt. F. F. MacKinnon.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. J. D. Draper; Sgt. G. J. Goodwin; Sgt. B. W. Shelnutt.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—Sgt. C. S. Milne.

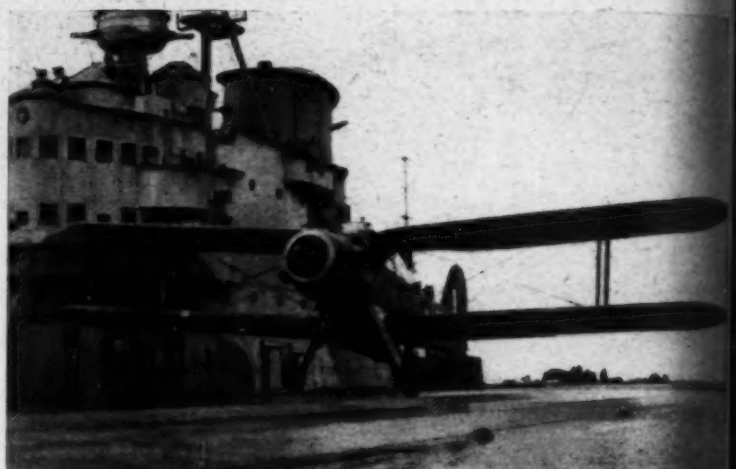
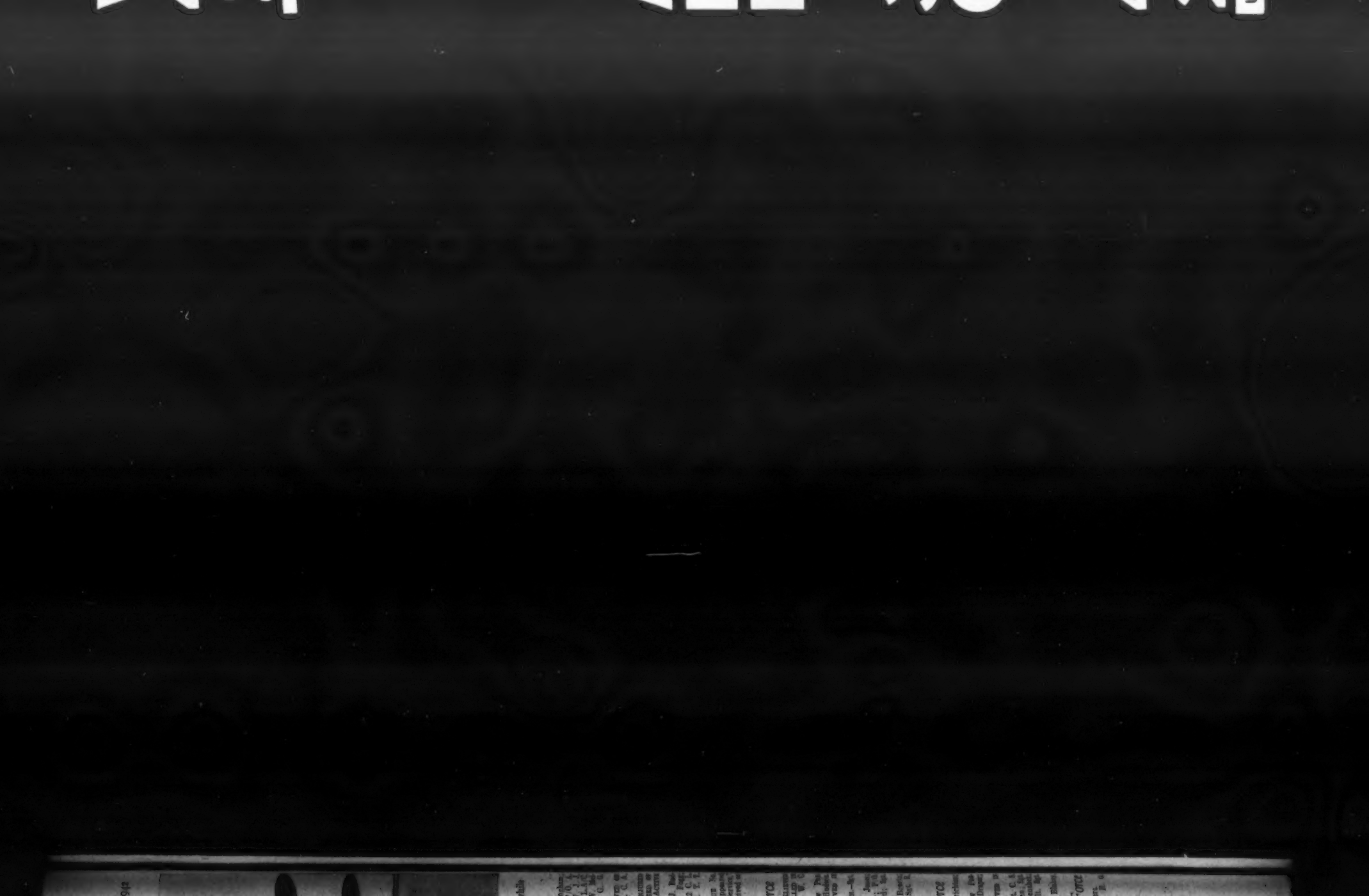
MISSING.—Sgt. F. H. E. Anger; Flt. Sgt. C. A. Carruthers; Sgt. W. A. Cross; Sgt. G. Ewen; Sgt. J. A. B. G. Galloway; Flt. Sgt. F. J. Menhell; Sgt. J. W. Mosey; Sgt. R. E. Nies; Flt. Sgt. J. L. H. Phillips; Sgt. E. Westbrook.

KILLED ON ACTIVE SERVICE.—Sgt. A. D. Miller.

Royal New Zealand Air Force

KILLED IN ACTION.—P/O. G. P. Chambers.

KILLED ON ACTIVE SERVICE.—P/O. C. E. G. Priest.



A Fairey Albacore, with torpedo, just airborne as it passes the "Island" while taking off from one of our carriers.